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MONTHLY INTERNATIONAL FEATURE ISSUE

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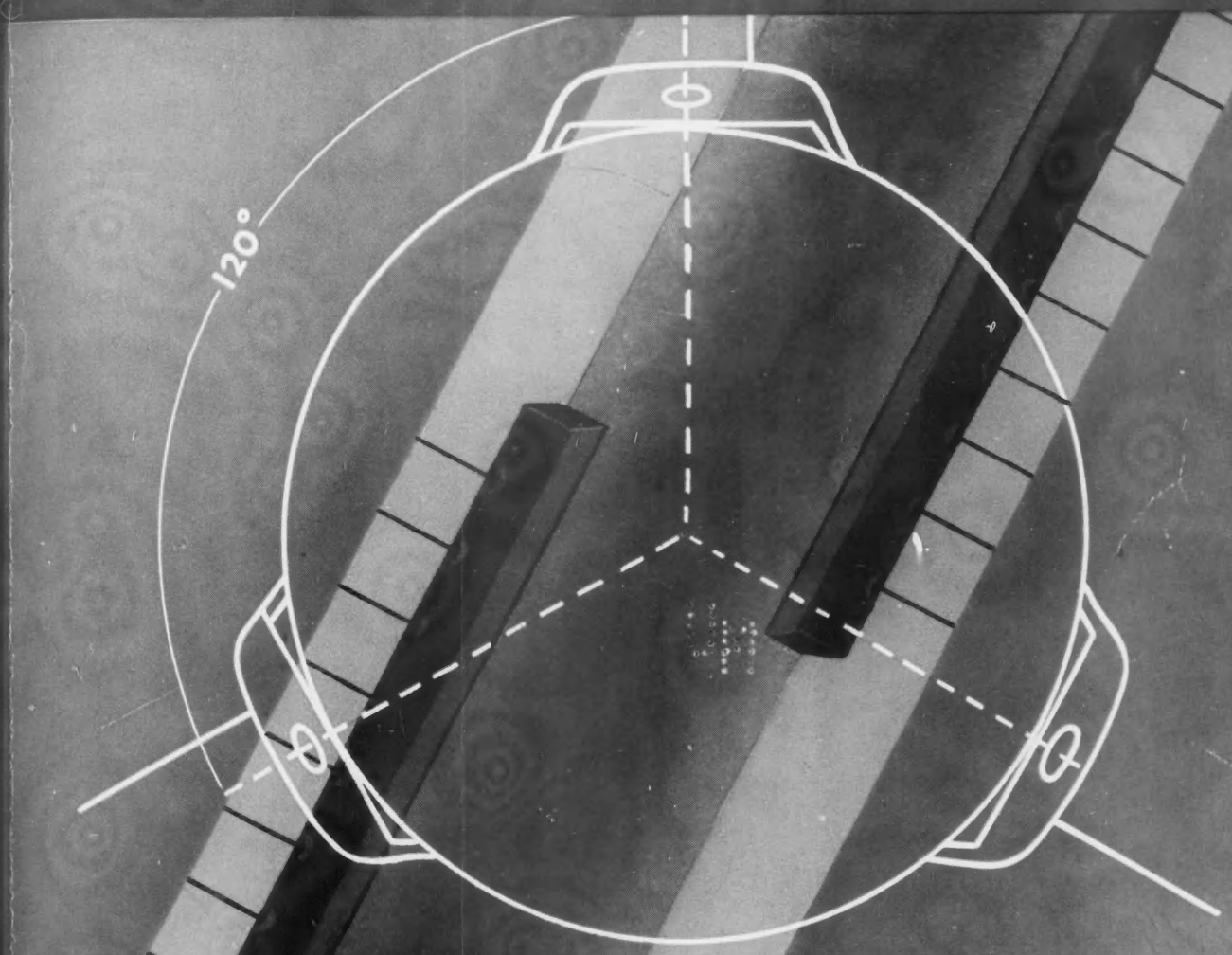
The OIL WEEKLY

FOR THE DRILLING, PRODUCING, PIPE LINE INDUSTRY



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VOLUME 123, NUMBER 1

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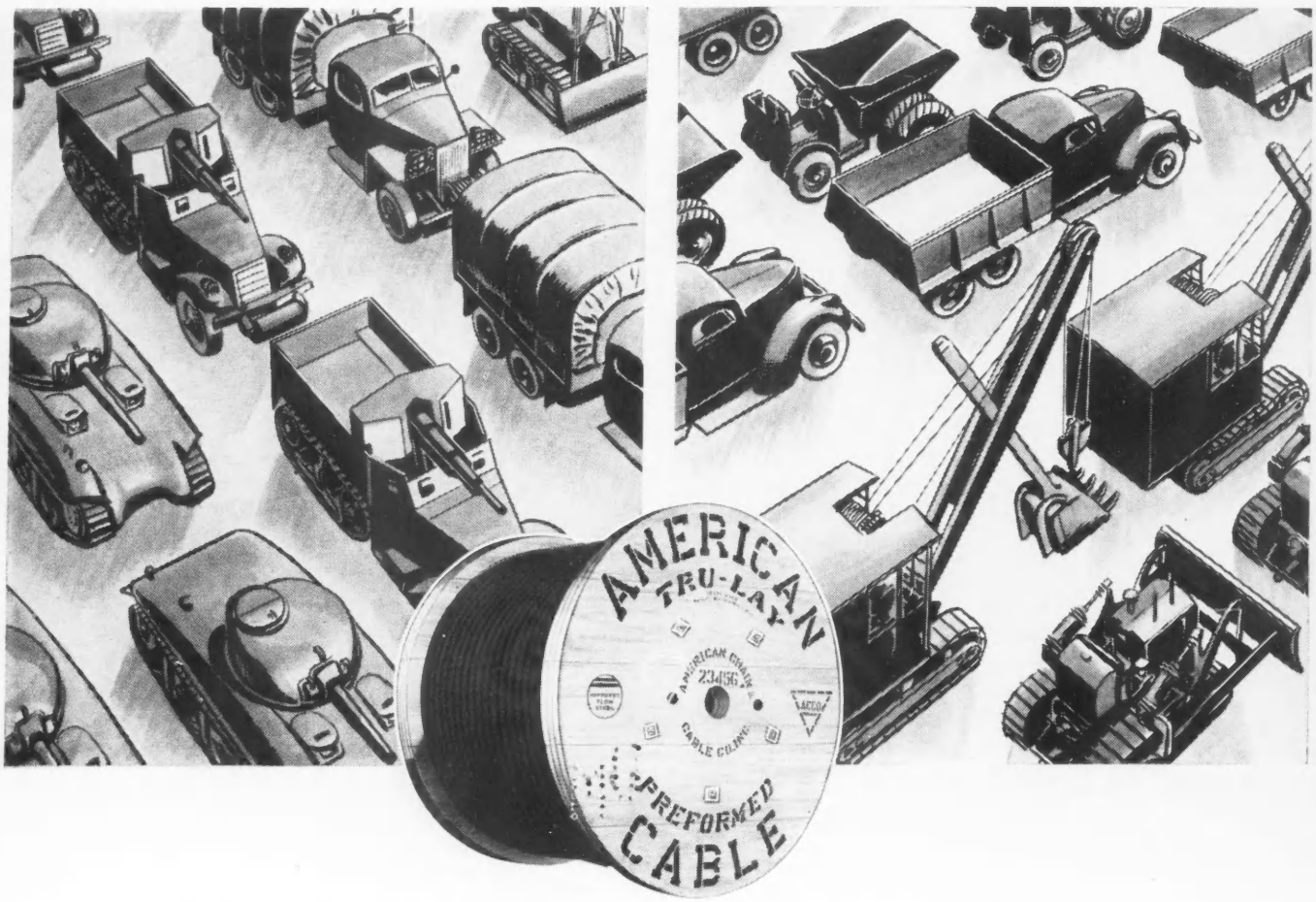

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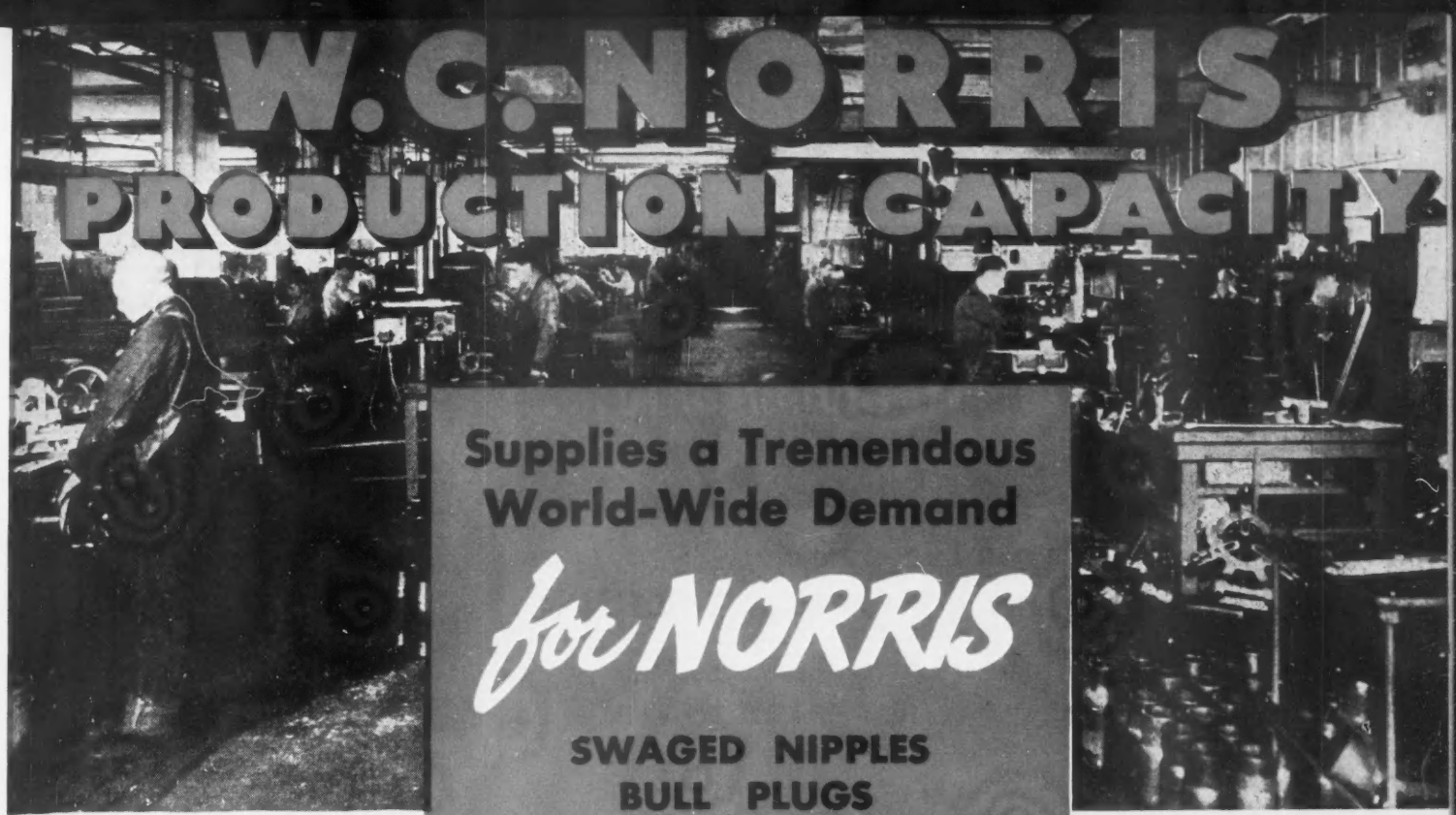

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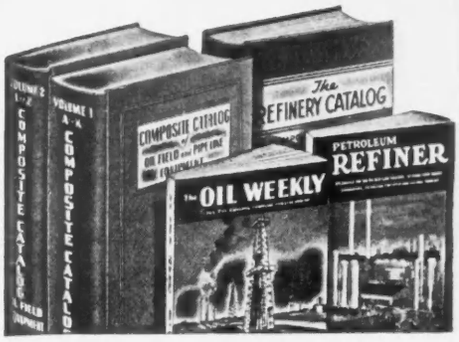
Looking Ahead

WITH THE EDITOR

THE application of production decline curves to study definite functions of producing wells, leases or fields has been used since the middle 1920's with a great deal of success. These methods usually involve plotting actual field data on cartesian, semi-logarithmic or logarithmic paper and drawing a curve through these points so that an equal number of points appear on either side and at equal or near equal distances from the curve.

With the advent of proration and its impending restrictions of steady flow rates whereby production was varied from time to time to meet demands, such curves became unsuited for a projected study of this nature. However, there remains a large number of non-prorated fields and "stripper" wells to which this method of reservoir study still applies with mathematical agreement. In an attempt to make these reservoir studies more accurate through the application of various types of production curves, Dr. Sylvain J. Pirson, School of Mineral Industries, Pennsylvania State College, presents a mathematical treatise on the subject in his article, "Mathematical Methods of Decline Curve Extrapolation and Reservoir Calculation," which will appear in next week's issue of THE OIL WEEKLY.

His is a mathematical solution which will produce a more "probable" result in projecting and predicting reservoir behavior. This method is often termed "curve fitting" or "rectification of a curve" because it is a search to find a theoretical formula that will most aptly fit production data in order to project the data into future production. Mathematical formulas are first determined for each particular type curve, and a thorough analysis made of the constants involved accompanied by the most accurate method of determining these constants. After the most suitable constant has been determined, it is applied back in the formula of the curve and solved for unknown quantities within definite limits.



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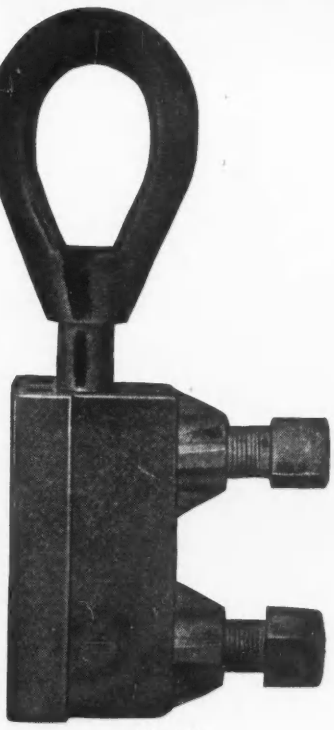

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NO. 205

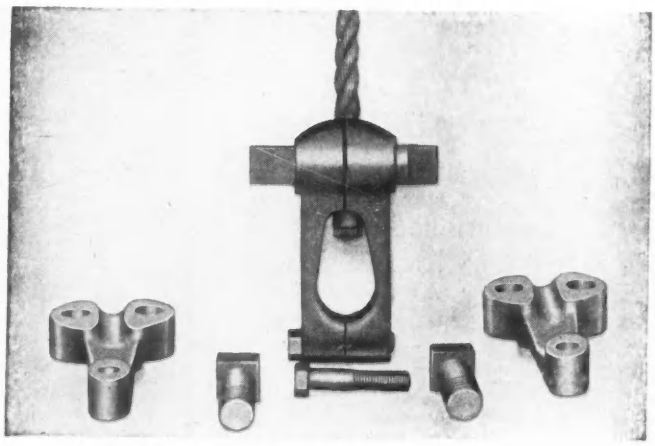
Ratigan No. 204 and No. 205 Polish Rod Grips each consists of three parts—the body, connecting block, and the gate—and are identical in capacity and mechanism except that trunnions are added to the No. 205. These trunnions should be at the bottom when operating.

The height of the No. 204 Grip is less than that of our No. 7, one of our popular screw type grips, and the body is approximately one-half the width; while the weight is considerably less. It will accommodate most of the carrier bars supplied by manufacturers of unitized pumping equipment.

The No. 205 Grip was designed as a combination carrier bar and grip, and will accommodate centers from 8" to 10". Due to the short distance between the horsehead and the stuffing box on present types of pumping units, we recommend using the No. 205 Grip with the Ratigan No. 181 Wire Line Clamp, shown below, which is adapted to the trunnions on this grip, and also is used extensively on all types of wire line horseheads.

The trunnions on the No. 205 Grip allow more flexibility of the wire line between the trunnions and the bottom of the horsehead, and will prolong the life of the cable. Also, the No. 181 Clamp being short, the operator obtains the benefit of all the cable possible. The clamp eliminates babbitting, and keeps the lines in the center of both the grip and the polish rod, where they should be.

A comparison of the No. 204 and No. 205 Grips with two of our former major screw type grips is given in table:



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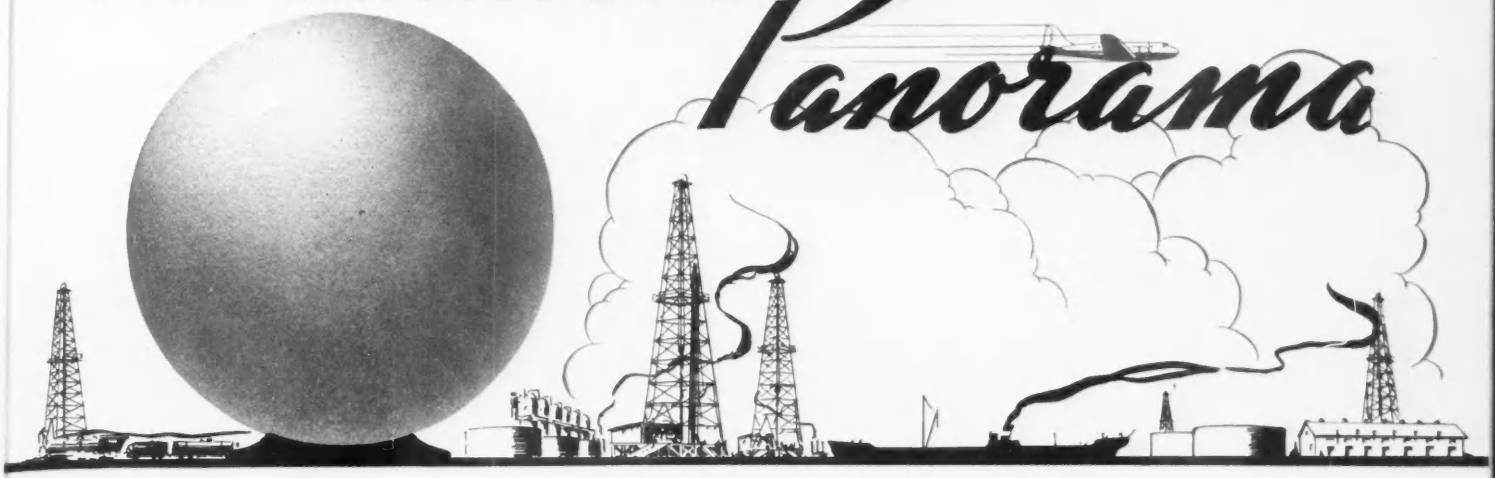


Bureaucrats Give Bad Advise to President

PRESIDENT TRUMAN held true to the ideals and policies that flowered over four presidential terms when he deplored a provision that Congress wrote into the Farmers' Home Corporation Act of 1946, requiring that any conveyance of land by the government under the act shall include all mineral rights. The President asserted that the U. S. government should reserve oil and gas rights in disposing of federal farm and other lands, and while signing the new law, expressed hope that Congress would repeal the provision at the next session.

"It is . . . important that the government reserve ownership of oil, gas and other minerals critical to the national defense and economy," he declared. . . . "Where the government is disposing of lands which may contain these minerals (fissionable materials, oil, gas, etc. in lands now under federal ownership), it should safeguard their prudent development by a reservation of mineral rights."

Representative Gossett of Texas, author of the section attacked by Truman, ably defended it, said the President evidently misunderstood its purposes and objectives, and pointed out that the government owns in fee 24 percent of land in the U. S. He declared that reservation of mineral rights was "a vicious practice which Congress has attempted to stop." He said the provision did not interfere with government stock-piling of critical materials but simply sought to preserve to citizens and to states the constitutional rights of ownership. "Already the government's reservation of mineral rights under small tracts of land has seriously disrupted land values and obstructed numerous normal business operations throughout the country," Gossett asserted.

Congress previously sought to end this "pernicious" practice, he said, through a provision of the act passed in the 78th Congress (Public Law 401), permitting prepayment of purchase price of certain housing sold to individuals by Resettlement Administration or Farm Security Administration. This expression of Congressional intent was ignored and in the current act criticized by the President, he said, and "Congress has sought to make its intent so clear that executive agencies could no longer rob the people of their just property rights.

"The President has evidently received some exceedingly bad advice from some of the bureaucrats who want the government to own and control everything," Gossett continued. "When the government becomes everybody's landlord, democracy will no longer exist. Americans must not become pawns of a totalitarian state."

In both World War I and World War II, privately owned and controlled U. S. petroleum and U. S. industry meant much in overwhelming the nation's enemies. In the light of those two acid tests, it is hard to see why the national defense should suddenly demand concentration of mineral rights and control in the hands of government administrators.

The real question involved in this matter was not one of national defense but one of government ownership and control versus private ownership and development. Fortunately, Congress has not allowed itself to be confused on the issue, and its view in favor of private enterprise has prevailed over that of the chief executive on the side of government ownership.

Uniform Base For Natural Gas Reports

ADOPTION of a uniform pressure base in reporting natural gas production to state conservation departments, as recommended by the Interstate Oil Compact Commission's Research and Coordinating Committee would be a definite improvement and a step in the right direction.

The committee's recommendation is that a base of 14.65 pounds per square inch (four ounces above assumed atmospheric pressure of 14.4 psi) be adopted by all states in reports and statistics relating to gas production in order to establish uniformity and put figures from every state on a comparable basis.

The recommended base of 14.65 psi is required by statute in Texas and Arkansas. Laws in other gas producing states do not specify the base, and as a consequence the figure set by rule or regulation varies widely.

Pressure base is an important factor in gas measurement, since when a specific base is established, that figure determines the unit pressure condition of a cubic foot of the measured gas. Due to the compressibility of gas, a cubic foot is not of a definite volumetric size and is subject to variation.

The pressure base established by state conservation and tax departments for computation of deliveries for tax and record purposes often is not the same as specified in the oil and gas lease or contract. General adoption of the Compact's recommendation eventually should remedy this.

The Week's News

STRIPPER-WELL subsidies have been cut 25 cents a barrel "across the board" to compensate for increases in posted prices since the suspension of OPA control. Some operators are seen as losing money unless buying companies raise prices. Page 10.

Elk Hills Contract—The House Naval Affairs Committee today starts a study of the Standard Oil Company of California Elk Hills contract with a view to revision to relieve the company from costs which have thrown its operation in the naval reserve in the red. Page 11.

Mission to Germany—The Department of Commerce has sent a party of technical experts to Germany to study Nazi research in the use of oxygen in the synthesis of liquid hydrocarbon products. Page 14.

Survey Funds Lacking—The Bureau of Mines is without funds for a survey of petroleum stocks, suggested at the Interstate Compact Commission meeting, but will ask Congress for money next year if the industry wants the study. Page 14.

Draft and Key Personnel—The OGD will advise CPA as to deferments from the draft for key personnel in the oil industry, including natural gas. Page 11.

Jester's Successor—Nomination of Beauford Jester for governor of Texas means that Texas will have a new railroad commissioner in January. Jester has said he will not resign until he is sworn in as governor, and that he will then name his successor. Page 12.

Disposal of Surplus Property—War Assets Administration is far from a determination of the best bids for the Big Inch pipe lines and final action may not come until after Congress meets. Difficulties are being encountered in disposing of the 100-octane gasoline plants. Page 16.

Stripper-Well Subsidies Cut Back in Order By Reconversion Director

Stripper-well subsidies were sharply cut back by Reconversion Director John R. Steelman last week in an order reducing premium payments by 25 cents a barrel, effective as from August 1.

Steelman estimated that the cut-back will save the government $2.5 million a month, and represents the amount by which producers have benefitted from increases in posted prices since OPA controls were lifted.

Most subsidies ranged from 20 to 35 cents a barrel. Under Steelman's order, all premiums of 25 cents or less a barrel will be discontinued and higher premiums will be reduced by 25 cents, leaving the maximum premium 10 cents a barrel.

Most oil men took the view that the subsidy was due to be cut sooner or later. It was pointed out, however, that inequities would result from making the cut across the board, since some producers are not getting a price 25 cents higher than the OPA ceiling and accordingly will get less for their oil unless purchasing companies raise their posted prices.

Independent operators are split over the desirability of the subsidy. Suggestions from Washington that methods of providing permanent assistance be explored, made informally by officials concerned over petroleum supply, have appeared to arouse but little interest.

According to Plan

Steelman explained that "reducing subsidy payments when producers benefit by price increases is in line with the general program established by Congress for the ultimate removal of subsidies."

Under this plan, he added, "most operators of stripper wells will receive the same return per barrel and will have the same incentive to produce the oil which the country needs as they did under price controls."

The Administrator admitted that in some pools the price has advanced by less than 25 cents, although in a few cases the increase has exceeded that amount and in a few areas no price increase has occurred.

"In the administration of this program," he said, "it has been the practice to reduce the amount of reimbursement made to any purchaser of stripper crude on account of subsidy paid to the producer by the amount by which he failed to pay the ceiling price. Now that price control on petroleum and petroleum products has been removed it seems proper to use the general level of market price increases as the guide to what the purchaser should pay for oil if he is to receive the full applicable subsidy rate."

Demands on RFC

Steelman's directive called upon the Reconstruction Finance Corporation:

1. To reduce the per-barrel rate of premium payable by the larger of the following two amounts: (A) 25 cents or (B) the amount by which the applicant's highest posted purchase price in effect on or after August 20, 1926, for crude oil is in excess of the OPA maximum price (exclusive of premium) applicable to such crude as of June 30. Except that for the period August 10 through August 19, the amount shall be that by which the applicant's posted price, in effect on the date of purchase, is in excess of the OPA maximum price (exclusive of premium) applicable as of June 30.

2. To reimburse purchasers for the excess of the amount expended for crude over the larger of (1) the OPA maximum price (exclusive of premium) applicable to such crude as of June 30 plus 25 cents, or (B) the purchaser's highest posted price in effect on or after August 20, but in no case shall reimbursement exceed an amount equal to the purchaser's rate of premium, calculated in accordance with (1) for such crude multiplied by the number of barrels purchased.

3. To make premium payments to eligible products of an amount equal to their rate of premium, calculated in accordance with (1), multiplied by the number of barrels produced and not sold but refined, consumed or otherwise sterilized by the producer.

Future additions to the eligible list are to be limited to pools with an average per-well production of less than five barrels daily. High-cost pools with a production of more than nine barrels daily per well also may continue to be listed.

The directive also provided that the premium rate for crude from any listed pool may be further reduced upon direction of the Administrator upon 30 days' notice "or in the event it is determined that there has been an additional general price increase by the petroleum industry."

Pennsylvania Reaction

Considerable interest is attached to the effect of the subsidy cut on the Pennsylvania-grade area, but officials said producers of Pennsylvania crude will be in the same position as they were in June, since posted prices in that area were raised 25 cents a barrel and now the subsidy is reduced by that amount.

The subsidy on Pennsylvania crude was considerably higher than that granted on other production—75 cents a barrel. Under Steelman's directive, it was said, the premium will be reduced to 50 cents a barrel. RFC officials said the reduction will not affect the relative position of Pennsylvania oil.

Sees "Conservation Payment" As Stripper Well Solution

The National Oil Conservation Committee, with headquarters in Tulsa, has taken issue with the Texas Independent Producers and Royalty Owners Association on the latter group's stand of opposing "any and all subsidies."

The Committee is headed by John G. Catlett, executive chairman, and Ernest Shamblin, executive manager.

Shamblin, in a reply to a recent statement of opposition to subsidies by H. J. Porter of Houston, president of the Texas group, said his committee believed "the petroleum industry deserves to know that this 'opposition to any and all subsidies' could well be meant to include the oil depletion clause on

income tax and the excise tax on oil imports."

He declared his committee was on record as urging the elimination of OPA price controls and favored a general increase in the posted price of crude oil.

"We have publicly stated again and again that our recommendation is not for a subsidy payment for the benefit of stripper well operators only, but is definitely a conservation payment for the express purpose of recovering millions of barrels of oil that otherwise would be lost," Shamblin declared.

"We believe if the industry does not initiate measures to eliminate the preventable waste of oil that in the interest of public welfare and our national defense, the government will be forced to exercise a control over the oil industry which both Porter and our organization desire to avoid."

Shamblin said his organization, representing thousands of stripper well producers, is dedicated "to the proposition of a conservation program supported by a conservation payment for stripper well production as the only practical solution to our problem of oil reserves so vital to our national security and economy."

OGD to Advise on Draft Consideration of Key Men

The Oil and Gas Division of the Interior Department has been designated by the Civilian Production Administration to pass on applications for occupational deferment of key workers in the petroleum and natural gas industries.

A limited number of "supervisory, technical or scientific personnel whose removal would significantly retard production" will be certified by the OGD as eligible for inclusion in Class II-A, deferred from military service.

It was pointed out that no industry has been specifically cited as essential to reconversion and each application for deferment will be considered on its merits.

Employers or self-employed registrants in the industry desiring CPA certification must submit a complete set (original, duplicate and triplicate) of Selective Service Form 42A (Special Revised) to the Office of Labor Requirements, Civilian Production Administration, Washington 25, D. C.

Supervisory personnel are those responsible for directing and coordinating the activities of a group of workers on a specific job.

Technical personnel are employes who by reason of specialized training and/or work experience are particularly qualified to perform work of a highly technical nature, such as engineers, metallurgists and journeyman patternmakers.

Scientific personnel are those educationally qualified to perform professional work in the physical sciences and whose activities are immediately and directly related to production processes.

Elk Hills Contract Review Designed To End Losses by Operating Company

Revision of the Elk Hills contract between the Navy and Standard Oil Company of California to relieve the company of certain costs which it now bears is before the House Naval Affairs Committee for consideration.

Members of the committee were called back from their vacations by Chairman Carl Vinson of Georgia to meet today to study contentions of the company that it is losing money under the present agreement. Navy officials in charge of the Elk Hills reserve are supporting the company, and recommend changes to eliminate inequities.

In actual operation the contract has not worked out as designed. In making the agreement it was planned that upkeep costs were to be shared between the company and the Navy, with Standard bearing one third and the Navy two thirds of the expense, in line with the respective interests of the company and the government in the reserve. However, it is explained, because of the wording of provisions regarding oil withdrawals, the company now is forced to pay all such costs.

Since it is the policy of the government not wittingly to enter into contracts under which the contractor will lose money, the department is invoking a provision permitting changes if the Secretary of the Navy finds that inequities exist.

The original contract, entered into in November, 1942, was rescinded following a congressional investigation of the circumstances under which it was negotiated and a ruling by the Attorney General that the Navy did not have authority of law to make such an agreement. Legislation authorizing a contract was passed in June, 1944, and the present agreement was immediately executed.

Under war conditions, with production increasing to a maximum of 65,000 barrels daily, the contract worked out all right, but when output was cut back at the end of the war and the field was placed on a stand-by status, the company found itself in a disadvantageous position.

As a result of the efficiency with which the field was developed and produced, the Navy during the war received nearly 12,800,000 barrels of crude, 1,130,500 barrels of natural gasoline and 1,941,950 mcf of natural gas as its share of the output. The government's expense was $13 million and its revenue $12.5 million, resulting in a net estimated loss on a cash basis of $505,000, but had production continued through the whole 18 months originally contemplated.

Wage Policy Committee of Oil Workers Plans Session

The recently formed wage policy committee of the Oil Workers International Union will meet October 21 in Kansas City to consider a four-point program in line with policies adopted at the OWIU convention in Fort Worth, O. A. Knight, international president, has announced.

A proposed upward adjustment of wages to meet the rising cost of living will be the first order of business for the committee. The other three points to be considered are guaranteed annual wage, uniform wages in each classification and establishment of an adequate health and accident fund for protection of the oil workers.

Petroleum Imports in June Drop to 10,505,000 Barrels

Petroleum imports in June dropped to 10,505,000 barrels from 12,450,000 barrels in May, but receipts for the first half of the year were the highest in over 20 years, according to figures compiled by the Department of Commerce.

During the first six months of 1946, imports amounted to 66,874,000 barrels, a 12,800,000 barrel increase over the 54,074,000 barrels imported in the corresponding period last year.

June imports included 6,268,000 barrels of crude, against 7,784,000 barrels in May and brought the total for the half-year to 43,901,000 barrels against 31,673,000 barrels in 1945.

Refined imports were 4,237,000 barrels against 4,666,000 barrels, with a six-month total of 22,973,000 barrels against 22,337,000 barrels.

By countries of origin, Venezuela led with 5,171,000 barrels in June against 6,608,000 barrels in May and 39,029,000 barrels for six months against 26,740,000 barrels; followed by Netherland West Indies with 3,774,000 barrels for the month against 4,178,000 barrels for May and 19,981,000 barrels for the half-year, against 20,686,000 barrels. June imports also included 896,000 barrels from Mexico, against 778,000 barrels the preceding month, 651,000 barrels from Colombia against 886,000 barrels, and 13,000 barrels from other countries, against none. For the half-year Mexico furnished 3,145,000 barrels against 1,564,000 barrels in 1945; Colombia 4,690,000 barrels against 4,279,000 barrels; Trinidad and Tobago 15,000 barrels against 700,000 barrels, and other countries 14,000 barrels against 81,000 barrels.

West Virginia Line

United Fuel Gas Company has awarded contract to Associated Contractors and engineers, Houston firm, for the construction of approximately 49 miles of 16-inch natural gas lines in West Virginia. The line will be from United's Cobb compressor station through Knowha and Roane counties.

Nomination of Jester Means Texas to Have New Railroad Commissioner in January

Nomination of Beauford Jester as the Democratic candidate for governor in the run-off primaries means that Texas will have a new Railroad Commissioner in January. Jester has said that he will not resign his Commission job until he is sworn in as governor, and that he will then name his successor. Jester's term has four years more to run.

If Jester follows the procedure he has announced, then the man appointed will have to run in 1949 for the remaining two years of the unexpired term, and again in 1951 if he wants to stay on the Commission. It is possible, however, that another and more graceful program will be followed.

The Democratic Committee will be reorganized on September 10, and current reports indicate that Jester will control this committee. Should Jester resign after this reorganization, the Committee could place on the ticket for the November election the name of the man Jester dictates.

This nominee would then be running without opposition from any other Democrat for the unexpired term. Having been elected on this basis he would then be able to serve four full years without a race. Further, Governor Coke Stevenson could appoint the nominee as soon as the Committee had selected him.

Because of the longer term of service before the need for a campaign, such a procedure should be attractive to a larger number of qualified men, those not now well known politically. The new governor might find himself off to a better start, especially if the appointee is no political hack.

Jester will have another appointment of interest to oil men: the Texas representative on the Interstate Oil Compact Commission. Sidney Latham was appointed to the place by Governor Stevenson this year. The term expires each January.

Jester indicated in his platform that the increased pensions and other governmental costs he advocated could be met without tax increases. Because of his familiarity with the needs of the Roalroad Commission for suitable housing, he should look with favor on a bill to provide a new building from funds which the oil and gas industry contributes.

Supervision of Oil in Middle East To be Debated by Cooperative Group

International supervision of Middle East oil on the basis of the Atlantic Charter will be brought up by delegates of the Cooperative League of U.S.A. at the meeting of the International Cooperative Alliance in Zurich, Switzerland, in October, it was determined at a meeting of the League's board of directors in Chicago last week.

ICA is a permanent consultant of the Social and Economic Council of the United Nations, the League says, and will be asked to urge steps by the Council to set up oil distribution in a spirit of fairness to the small states of Iran, Iraq, Saudi Arabia and others "now squeezed in the great powers' rush for petroleum."

The League also reported that co-ops in China are to be rehabilitated and that trustees of the U. S. Freedom Fund have appropriated a $10,000 revolving allotment for shipment of kerosine and other petroleum products in reviving international trade. The products will be distributed by co-ops in China.

Meantime, Howard A. Cowden, president of Consumers Cooperative Association, speaking on "CCA's Experience" before the summer session of the American Institute of Cooperation, Purdue University, Lafayette, Ind., last week praised the growth of the cooperative movement.

When World War II began, CCA was 10 years old, Cowden said. Just about a month before the start of the war, the cornerstone of the office building of CCA's first petroleum refinery was laid at Phillipsburg, Kansas. It was not only the first cooperatively-owned refinery in the United States, but it marked the most ambitious step into production which CCA had yet taken, Cowden declared.

"The refinery, using 3500 barrels of crude oil a day," Cowden said, "had cost $551,000 at the time it went into production January 1, 1940. Some 70 miles of pipe line to gather crude for the plant brought the total cost to nearly $900,000. That figure doesn't seem so large now. Then it was a colossal sum. Farm prices were below parity, and in some areas the farmers had not raised a crop for six or seven straight years. Yet these farm people bought nearly $365,000 in preferred shares to make the refinery possible.

"Only ten years before, six local cooperatives had put up $3000 to get CCA started. A little later, $4000 was added, bringing the total capital to $7000. Capital to operate the growing wholesale during that decade had come largely from savings and from borrowings. CCA, in that period, had begun to compound lubricating oil, manufacture grease and paint, and buy refined products from old-line refiners for its growing membership."

Cowden said CCA drilled its first well in the fall of 1940, and it proved to be an oil producer. Ever since then CCA has been expanding its crude oil production by drilling in proved and semi-proved territory, and by acquiring fields already in production.

"Small-scale business men in the United States," Cowden said, "are beginning to realize what they are up against, and they are complimenting the foresight and sagacity of the American farmer by taking a leaf from his notebook—by organizing cooperatives to help them stay in business against the big fellows. Today more than ever before, business is conducted by veritable giants.

"We were fortunate," said the CCA chief, "in being able to expand our productive facilities in petroleum every year during the war. Without our refineries we could not have served our members well. Without these plants, many local cooperatives would have been driven into the arms of private profit suppliers. Because of these facilities, and others, out of a total volume of more than $26 million last year, more than $17 million of commodities were produced in our own factories."

Hugel Writes

Dr. H. Hugel, inventor of sensitive bottom hole pressure and temperature recorders and senior exploitation engineer of Astra Romana, major Roumanian oil company, now resides in the French occupation zone of Germany, having been transferred to Germany during the war.

In a letter to THE OIL WEEKLY, Hugel said he desired to renew his communication with his friends in the United States. He is well known to oil men in the United States, having traveled in California, Texas, Oklahoma and Louisiana in the spring of 1939. His address is: Care of Dipl. Ing. Schuster, Bregenz, Schwerzenbachstr, 12, Austria.

Wage Hikes and New Contract Demanded by Pemex Workers

Petroleos Mexicanos (Pemex), government-owned Mexican oil company, has received demands for general wage increases and a new labor contract which the oil workers' union says must be met by September 9 if a nation-wide walkout is to be avoided. Specific demands were not made public immediately.

The present labor contract, which the union charges has been repeatedly violated, expires September 8. Special meetings are being held between officers of Penex, the union and the government in an effort to settle the dispute before the contract expires.

A resume of recent labor difficulties of the Mexican oil industry will be found on page 47, International Feature Section, in this issue.

Says Cooperation Would Stop East Texas Flares

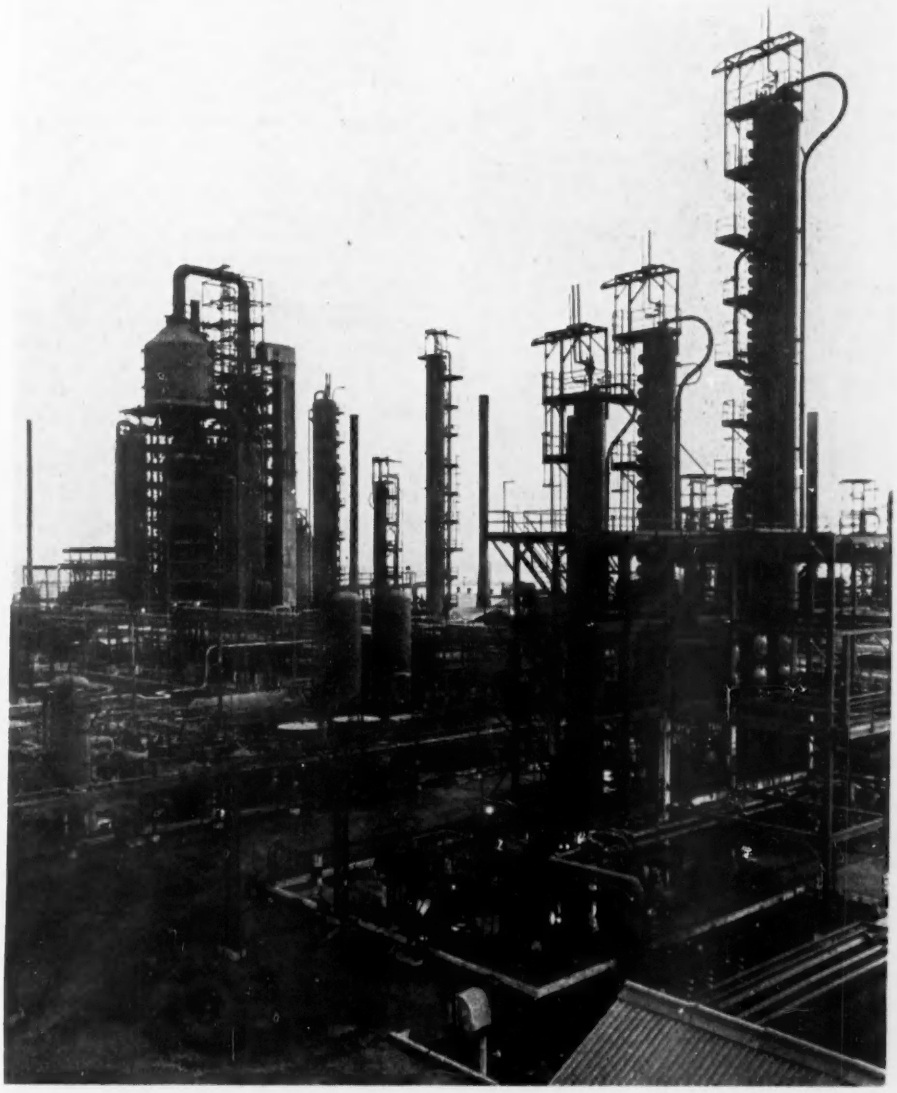
The Gas Committee of the East Texas field has recommended to the Texas Railroad Commission that a general order letter be written to producers and pipe lines in the field, calling attention to current field rules and regulations.

The committee was appointed by the Commission last April to study the casinghead gas situation in the East Texas field, being empowered to make a detailed study of flared and non-utilized gas, and to offer recommendations.

The committee was of the unanimous opinion that if the responsible personnel of the producers and crude oil pipe line companies in the East Texas field would adhere to present rules and regulations, the waste of unprocessed rich gas in the gasoline plant flares, would be stopped. Such cooperation, the committee agreed, would also tend to give an even flow of flared residue gas which would eliminate the principal objection that industrial gas purchasers have heretofore given as their reason for not wanting to purchase this residue gas from the gasoline plants.

Practically all of the gasoline plants have an overload of incoming rich gas during the daylight hours and are operated under capacity at night, it was reported. An average of 25 million cubic feet of residue gas is being burned each day in East Texas gasoline plant flares and a majority of this gas is being burned during daylight hours because of the lack of adherence to flow schedules. Pipe line operators were asked to level out oil runs from leases through the full extent of the month.

Refinery Record Reflects Venezuela Production



The Aruba refinery of Lago Oil & Transport Company, affiliate of Standard Oil Company (New Jersey), shown above, exceeded four of its own all-time records in July to reflect the sharp increase in Venezuela production. The refinery, first in the world to process a billion barrels of crude, handled a record run of 11,059,000 barrels of oil for the month. A record daily run of 416,000 barrels was established on July 23.

AIME Production Geology Group Announces Series of Lectures

The Production Geology Committee of the Petroleum Division of the AIME will hold a series of lectures concerned with the dependence of production problems on geologic factors. The program is being arranged by Jan Law, chairman of the Pacific Chapter's Production Geology Committee. Meetings will be held at the General Petroleum Auditorium, Second and Main Streets, Los Angeles.

Because of the common problems to be investigated the sessions will be joint invitational to geologists and engineers.

Petroleum Engineering as aided by the contributions of physics and physical chemistry has evolved a system adequate to treat with the problems of production engineering which would be encountered in a homogeneous reservoir.

Current literature of production engineering contains numerous examples of attempts to treat with the heterogeneity of reservoirs. Members of the Production Geology Committee believe that a restatement of the origins and environmental conditions present at the time of deposition of California reservoirs should be beneficial in the attempt to recognize the effect of geologic factors on production problems.

The series is concerned with the development of proven fields as to completion methods and production problems as dependent on the geologic factors, mineral composition, structure and texture. The series is not concerned with problems of exploratory geology.

The titles of the lectures are indicative of the purpose of the series:

September 23. "Dependence of Production Problems on Geologic Factors," E. C. Babson and Wm. W. Porter, II.

October 28. "Miocene and Pliocene Basins of Sedimentation," H. W. Hoots.

November 25. "Broad Principles of Sedimentation," M. N. Bramlette; "Subsurface Geologic Interpretation as Oriented by Basin Condition," Dean H. Sheldon.

January 20. "Quantitative Sedimentary Investigations," P. P. Goudkoff and Jan Law.

February 24. "Capillarity and Interstitial Water an Expression of Sand Conditions," John Sherborne.

March 24. "Prospective Application of the Principles of Reservoir Mechanics in California," Stanley Harold.

Resume and possible future programming.

Notices of meetings may be received by requesting them from Harold J. Clark, Secretary of the Southern California Section, AIME.

Suggested Petroleum Stocks Survey Said Impossible Until Funds Provided

No survey of stocks on hand such as suggested last month by the Interstate Oil Compact Commission's economics advisory committee can be made by the Bureau of Mines this year because of lack of funds.

However, Bureau officials said, if the commission or the industry makes formal recommendations for a canvass, a request for the necessary funds could be submitted to Congress and, if granted, the study could be made.

A survey of stocks would cost from $10,000 to $30,000, depending upon the field to be covered. The last survey, in 1936, cost $25,000 to $30,000, but most of the money was used in a determination of the quality of crude in storage which showed to be unfounded suggestions that it was of low grade because of water, bottom sediment and other contamination. If a study to determine merely how much crude and refined products were being held, it might be done for as little as $10,000.

Problems of Survey

At the time of the 1936 survey, it was held that the minimum working stocks required were about 210 million barrels and a reasonable economic level was 250 million. Current stocks now are low, and a survey would have to ascertain how much oil was tied up in pipe lines and other transportation and figure out the effects of the new high-speed, large-capacity tankers now in service as compared with those operated a decade ago.

These and other factors, such as the small production now shut in as compared with ten years ago, would have to be related to the anticipated demand in 1947 to arrive at any estimate of appropriate working stocks.

Demand Increase Likely

Before the end of the year, probably in October or November, the Bureau of Mines will issue a forecast of possible 1947 demand. Present indications, as yet not completely analyzed, foreshadow a drop in exports, a continued rise in imports, and more natural gas and cycle materials. Motor fuel demand may continue to rise, increasing five or ten percent next year, and distillate demand also may increase, but these factors are uncertain, depending upon the rate of automobile production and of automobile use, for the former, and the rate of conversion and new building for the latter.

However, the net result may well be an increase of three or four percent in total demand, which might mean an increase of five percent in domestic demand.

Experts to Germany to Study Synthetic Fuels

Four American technical experts associated with Hydrocarbon Research, Inc., New York, are en route to Germany to investigate development in that country of synthetic liquid fuels, as representatives of the Office of Technical Services of the Department of Commerce.

The major objective of the group is to study the use by German scientists of oxygen in the synthesis of liquid hydrocarbon products, including synthetic gasoline, lubricants and the heavier hydrocarbons, as well as German methods for producing oxygen.

Members of the group are Dr. Clarence A. Johnson, Mountain Side, N. J.; Norman F. Buschow, North Arlington, N. J.; Edward G. Engel, Roselle, N. J., and Dr. Judson S. Swearingen, New York. They are serving the OTS without compensation, and their living and travel expenses are being paid by their company.

Magnolia Job Finished

Magnolia Petroleum Company has completed 14 miles of 4, 5 and 6-inch crude oil line in the Lake Arthur area, including a crossing of the Mermentau River, in South Louisiana. Associated Contractors and Engineers of Houston was the contractor.

Louisiana Allowables Up

Louisiana oil allowables for September are 430,742 barrels daily. This is an increase of 1337 barrels daily over the August allowables. Total allowables by districts follow: Houma, 62,884; Lafayette, 116,341; Lake Charles, 65,093; New Orleans, 91,121; Monroe, 58,511; Shreveport, 36,792. Larger field totals include: Delhi, 17,373; La Salle, 19,418; Lake St. John, 13,048; Lafitte, 12,454; Erath, 18,775; and Paradis, 10,022.

Tanker Launched

Standard Oil Company of California's "F. S. Bryant," first large tanker (4.3 million gallons) to be designed and built postwar in the United States, and named for a company vice president and director, was launched August 27 at Chester, Pa., at the Sun Shipbuilding Company yards, Chester, Pa.

A variety of war-tested innovations in design and equipment also are embodied in the vessel. Seven pumps and seven cargo piping systems permit high-speed loading and unloading. Nearly a score of different petroleum products can be transported in bulk in the ship's 27 individual bulk cargo compartments.

A sister ship, the "R. G. Follis," named for Standard's president, is scheduled for launching in October.

New Mexico Meet

The annual membership meeting of the New Mexico Oil and Gas Association will be held December 4 in Artesia, N. M., according to Jack M. Campbell, executive secretary.

Roberts New Pipe Line Manager in California

W. C. Roberts is the new manager of California pipe lines for Shell Oil Company. Roberts succeeds Fred B. Simms who retired recently after 30 years as an employe of the company's pipe line department.

W. C. Roberts

Roberts was formerly assistant pipe line manager in California. He joined Shell as a pipe line dispatcher in 1916. He makes his headquarters in Los Angeles.

Simms had been in the oil industry 38 years and was engineer in charge of Shell's first pipe line from properties around Coalinga to the Martinez refinery.

250 Attend A. and I. Short Course in Gas Technology

More than 250 engineers and gas company officials were at the first annual short course in Gas Technology at Texas College of Arts and Industries, Kingsville, Texas. Under the direction of Dr. Frank H. Dotterweich, head of the Department of Engineering, and sponsored by the Southern Gas Association, the course contained more than 28 lectures given by gas industry leaders and authorities. The three sections of the course consisted of natural gas products, gas transmission, dehydration, air conditioning, dehydration of food and agricultural products, and the latest developments in gas turbine design.

Proration of Louisiana Gas To Be Considered at Meeting

Prorating natural gas in Louisiana will be considered by the committee appointed earlier this year, at a meeting at the Montelone Hotel in New Orleans September 12.

This meeting has been called by Conservation Commissioner Joseph L. McHugh for a discussion of the two plans which had been submitted to the committee at its May meeting. At this time the committee failed to agree on either plan submitted.

The two plans, one submitted by the Conservation Department, and the other by members of the gas industry, have called for proration similar to that already applied to oil.

Texas Well Permits

Permits to drill 97 new wells in Texas were approved by the Texas Railroad Commission last week. There were 22 in North Texas and 27 in Southwest Texas. West Texas reported 12 permits, and there were seven from East Central Texas, nine from the Gulf Coast, 17 from West Central Texas and three from the Panhandle.

Demand for September

The Bureau of Mines' forecast of demand for domestic crude in September is expected to be practically the same as for the current month, 4,770,000 barrels daily. The forecast for Texas will remain unchanged at the August figure of 2,120,000 barrels a day.

The government figures for the past two or three months have consistently been below actual runs by around 100,000 barrels daily and the Bureau now sees possibilities that stocks of distillate and kerosine are somewhat above seasonal requirements and a consequent cutback in operations in the final months of the year, unless demand is larger than now anticipated.

Experiments Prove Value Of Helium Gas as Tracer

Exhaustive tests in the Elk Hills naval petroleum reserve have demonstrated the value of helium in tracing migrations of hydrocarbon fluids in underground structures, it was announced last week by the Bureau of Mines.

Tested out as a tracer gas over the period of the past year, helium now is being used in other work charting subsurface oil and gas reservoirs.

Publications have been prepared describing a highly sensitive apparatus capable of quickly and precisely detecting helium in natural gas. The increased use of natural gas for recycling and for pressure maintenance, the bureau said, has emphasized the importance of a tracer gas such as helium in providing information on reservoir conditions.

The idea of using helium was conceived by R. A. Cattell, chief of the petroleum and natural gas division, who was seeking a chemically inert gas which would not lose its identity by combining with reservoir rock or fluids. The equipment for using the gas was developed by E. M. Frost, Jr., chemical engineer at the Amarillo Helium Plant. With it, the time of analysis was cut from 40 to 10 minutes per sample, and samples containing a few thousandths of one percent of helium was analyzed as readily as those containing one percent or more.

By injecting the gas, observing the length of time required for it to travel from the injection well to adjacent output wells and determining the concentration of helium in the producing wells, bureau engineers were able to chart with reasonable accuracy reservoir conditions between wells in the Elk Hills field.

FPC Sets Hearing on Building Gas Line to Mexican Border

The Federal Power Commission will hold a hearing September 18 on the application of the Reynosa Pipe Line Company for construction of a pipe line from the La Blanca and North and South Weslaco fields in Texas to the Mexican border for export of natural gas authorized by the commission last June.

The Commission will permit the Texas Railroad Commission and the company De Gas, S.A., to intervene in the proceedings, but will limit testimony and evidence to material relating to construction application and will bar representations dealing with the question of export.

Standard Refinery Processes Billionth Barrel of Crude

The Baton Rouge refinery of Standard Oil Company of New Jersey Thursday processed its one billionth barrel of crude. It is the first domestic refinery in the Jersey company to have achieved this total.

Seeks Bayou Permit

Application has been filed with the United States engineer office at Galveston by the Humble Oil & Refining Company for permission to lay 2½-inch pipe lines under Dickinson Bayou, about 3 miles east of Dickinson, in Galveston County, Texas.

Crude Production in the United States

(Estimates compiled by THE OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED August 31	August 24
Alabama	1,100	1,150
Arkansas	74,200	73,950
California	874,100	880,800
Colorado	37,000	39,500
Florida	150	200
Illinois	209,300	203,800
Indiana	18,000	17,750
Kansas	279,550	274,900
Kentucky	30,700	30,850
Louisiana	387,950	387,750
North Louisiana	84,150	83,950
South Louisiana	303,800	303,800
Michigan	46,850	47,050
Mississippi	72,500	76,800
Missouri	100	100
Montana	25,500	24,550
Nebraska	700	700
New Mexico	100,900	100,900
New York	14,100	14,050
Ohio	8,000	8,050
Oklahoma	385,500	384,600
Pennsylvania	36,900	36,850
Tennessee	35	35
Texas	2,119,800	2,119,800
Tex. R. R. Comm. Districts:		
Dist. 1. S. Central	19,500	19,500
Dist. 2. Lwr. Gulf Coast	155,100	155,100
Dist. 3. Upr. Gulf Coast	486,550	486,550
Dist. 4. S. West	224,300	224,300
Dist. 5. E. Central	43,050	43,050
Dist. 6. E. Texas Field	317,000	317,000
Dist. 6. Rest of N. East	105,650	105,650
Dist. 7-B. W. Central	32,650	32,650
Dist. 7-C. West	27,900	27,900
Dist. 8. West	490,600	490,600
Dist. 9. N. Central	132,700	132,700
Dist. 10. Panhandle	84,800	84,800
West Virginia	7,700	8,100
Wyoming	112,800	112,850
Total United States	4,843,435	4,845,085

Total stocks, foreign and domestic August 24, as reported by the Bureau of Mines were 225,672,000 barrels with a daily average production of 4,836,000 barrels and runs to stills 4,866,000.

Gabrielson Named Head Of Carthage Hydrocol, Inc.

Guy George Gabrielson has been named president of Carthage Hydrocol, Inc., organized recently to manufacture gasoline from natural gas. General counsel of the company since its organization, he will retain that position and continue his general practice of law in New York and New Jersey.

G. G. Gabrielson

Eight companies—The Texas Company, Forest Oil Corporation, Bradford, Pa., Niagara Share Corporation, Buffalo, N. Y.; United Gas Corporation, Shreveport, La., La Gloria Corporation, Corpus Christi, Texas; Stone & Webster, Inc., New York; Gulf States Oil Company, Houston, and Chicago Corporation, Chicago—are supplying $10 million of the capital required and the Reconstruction Finance Corporation has agreed to loan another $9 million

Directors of the company are George H. Clifford, president, Stone & Webster Service Corporation; Richard J. Dearborn, president, Texaco Development Corporation, Michael Halpern, vice president, The Texas Company, Percy C. Keith, president, Hydrocarbon Research, Inc., Harry T. Klein, president, The Texas Company; John F. Lynch, vice president, La Gloria Corporation; H. Neil Mallon, president, Dresser Industries, Inc., Cleveland; W. Frank Miller, vice president, Forest Oil Corporation; J. Fred Schoellkopf IV, president, Niagara Share Corporation, and Gabrielson.

A $15 million plant will be erected near Brownsville, Texas and gasoline and other chemical components will be synthesized from natural gas by a process developed by Hydrocarbon Research.

Gabrielson lives at Bernardsville, N. J., is a native of Sioux Rapids, Iowa, and was graduated from the University of Iowa in 1914 and Harvard Law School in 1917.

Interior Department Oil and Gas Division Adds McKenna

Patrick A. McKenna, petroleum technologist and former head of the crude oil and gas section of OPA, has been added to the staff of the Oil and Gas Division, Interior Department.

A native of Cement, Okla., McKenna worked for several years in the Oklahoma oil fields, and in 1935 formed a company to develop and manufacture a new type of plug-back and cementing equipment, heading the company until he entered the Army Signal Corps in 1942. He was given a medical discharge from the Army in 1943, when he joined the Maritime Commission, transferring to OPA in March, 1945.

Big Inch Bids Found Hard to Analyze; Sale of War Gasoline Plants is Slow

The War Assets Administration is encountering difficulty in disposing of the war-built 100-octane gasoline plants, and so far has sold, to Utah Refiners, only one of the 14 refineries.

There is some interest in acquisition of a small plant in California, but on the remaining dozen plants WAA has received only give-away offers.

While the disposal of the 100-octane plants is proving difficult because of their physical tie-in with refineries, disposition of the alcohol-butadiene plants is being slowed down by the grain shortage which would make operation difficult until world supplies have been brought up to normal and the drain on American stocks is relieved.

Big Inch Analysis

Meanwhile, WAA lawyers and accountants are reportedly finding it difficult to analyze the 16 proposals received in July for acquisition of the two Big Inch pipe lines, and expect their work to require another five or six weeks.

It is not now expected that WAA will reach any decision before November, at the earliest, and then will have to refer the matter to the Department of Justice for an opinion as to whether the proposed disposition will tend to further a monopoly. Accordingly, no final determination will be made until after Congress meets, in all likelihood, and this will be eminently satisfactory to WAA officials, who foresee a controversy no matter what they do.

WAA announced last week that it has sold two styrene plants, one in Texas City, Texas, to Monsanto Chemical Company for $9,550,000, to be used in the production of styrene for the Rubber Reserve Company and for commercial sale. The other sale covered part of the plant at Kabuta, Pa., which was sold to Koppers Company, Inc., for $3,265,000.

Production Priority

At the same time, the Civilian Production Administration announced that producers of butyl (GR-I) rubber, general purpose (GR-S) rubber and reclaimed rubber have been made eligible for priority assistance to maintain or increase production.

Such producers now may obtain CC ratings to purchase production materials, replacement equipment, additional equipment for increased production of petroleum butadiene, and materials needed for maintenance, repair, operation and construction.

CPA said that during the last five months demand has been such that the rubber manufacturing industry has consumed every pound of natural, synthetic and reclaimed rubber on the market, necessitating action to insure the maintenance of maximum production.

Pipe Line Official Named to Houston Controllers Group

S. G. Loy, assistant controller of Humble Pipe Line Company, has been elected president of the Houston Control of Controllers Institute of America. Others named to office include: vice president, E. C. Breeding, controller of The Texas Company; secretary-treasurer D. R. Boggs, chief accountant of Standard Oil Company of Texas; director, H. L. Smith, vice president, secretary-treasurer of that firm.

Dallas Control officers include: E. Clyde Seymour, controller of Magnolia Petroleum Company, president, and J. A. Goodson, controller of Hunt Oil Company, reelected a directed.

J. Norvelle Walker, vice president and controller of Royal Oil & Gas Corporation, Philadelphia, is new president of the Institute's local in that city, and Robert G. Dunlop, comptroller of Sun Oil Company, was renamed a director.

Roger W. Leason, vice president, treasurer and secretary of Emsco Derrick & Equipment Company, has been chosen secretary-treasurer of the Los Angeles Control.

Oil company executives have been elected directors of the local controls in their respective cities: A. W. Hair, division controller of Socony-Vacuum Oil Company, Inc., and R. A. Kroenert, secretary-treasurer of Great Lakes Pipe Line Company, both of Kansas City; William A. Jackson, assistant controller of Standard Oil Company (New Jersey), New York; Gordon B. Schaefer, chief accountant and office manager of Southeastern Pipe Line Company, and E. S. Worthington, secretary and treasurer of Wofford Oil Company, both of Atlanta; R. P. Schwalbach, comptroller of Wadhams Oil Company, Milwaukee; and F. S. Slick, assistant comptroller of Ohio Oil Company, Findlay, Ohio, named a director of the Toledo Control.

Contract Awarded for New Gas Line in California

Pacific Public Service Company, a Standard Oil Company of California affiliate, has announced that a contract had been awarded to Pacific Pipeline Construction Company for the construction of a new natural gas pipe line system from a point near Pittsburg, Calif., to the Suisun Bay, Kirby Hill and West Rio Vista gas fields, located in Solano County.

At present, Shell Oil Company and Standard of California have nine wells in the Kirby Hill-Suisun area which are productive of natural gas, and a Pacific Public Service Company wholly-owned subsidiary has one productive well in the West Rio Vista field none of which is connected to a pipeline system.

The cost of the line is estimated at $900,000 and it is scheduled for completion this year. The line will have a capacity of approximately 65 million cubic feet per day.

The proposed line will be interconnecting with the Stanpac pipe lines which connect the Bay Area to Kettleman Hills and the East Rio Vista field. Pacific Public Service Company is also the owner of five fourteenths of the Stanpac line.

The new line will make available additional gas for the fast-growing county of Contra Costa which is served by Coast Counties Gas and Electric Company, a subsidiary of Pacific Public Service Company.

Northern Natural Would Hike Capacity of Kansas Gas Line

Application has been filed with the Federal Power Commission by the Northern Natural Gas Company for authority to make additions to its pipe line system estimated to cost $12,667,600. The company plans to increase the capacity of its line north of Clifton, Kansas, from 325 to 407 million cubic feet per day to meet anticipated demands for gas during the winter of 1947-48.

The Commission last June authorized Northern to construct facilities to increase its line capacity from 270 to 300 million cubic feet daily to meet expected requirements this winter, and the company now has pending a request for six additional compressor units in existing stations to increase capacity to 325 million cubic feet.

The current application covers construction of new compressor stations at Sunray, Texas, and Dunnell, Minn.; compressor additions to 12 existing stations, and construction of more than 185 miles of 16 to 24-inch loops and connections.

Says More Hugoton Gas Exported Than Justified

Market outlets in the Hugoton gas field, located in Western Kansas, Oklahoma, and Texas, have approached a point where more gas is being exported than is justified under prevailing market conditions.

This was the contention of the Kansas Corporation Commission when it intervened in two cases before the Federal Power Commission.

In one case Michigan-Wisconsin Pipe Line Company asks permission to build a pipe line from Michigan and Wisconsin to the Hugoton field. In the other, Michigan Gas Storage Company proposes to store gas in two depleted fields of Michigan, obtaining the fuel from Hugoton through Eastern Pipe Line Company.

Natural gas is selling at Hugoton wells "at a price materially below its value," the Kansas Commission said in a statement filed with the FPC.

This situation, it declared, is due principally to the transportation of natural gas from Hugoton to distant markets "for base uses in competition with cheaper fuels under conditions where price, and price alone is the determining factor."

Safeguard for American Liberty

An Editorial by L. J. LOGAN, Associate Editor

(An indorsement of the Foundation for Economic Education and its program for promoting economic and political understanding as the means to keep men free.)

MANY who read this doubtless have deep convictions about the loss of liberty which has been going on in America, like the movement of a glacier. The reactions among you have varied from anger to worry, genuine sorrow, resentment, or pity for the deluded and betrayed who are giving up their liberty to false economic and political prophets, as a man stripped of decades of savings by a confidence man.

War veterans are being warned against the common swindlers, who would rob them of their purse, and this is well. But they are not being warned so much or so well against the more subtle and more insiduous politico-economic-social mountebanks, who offer elixirs to cure any ills they may encounter in a troubled postwar world of readjustment.

Likewise, former war workers and the public in general—the citizens of America—are seeing numerous articles that enumerate many of the favored tricks of swindlers, who are said to regard the field now as ripe for a harvest. But the mask is torn too infrequently from men who would make spoils of human liberties, using subversive methods toward establishing and wielding power over human lives and human destinies. Most of these seekers of power fail to reach the pinnacles, but their number is great, and if they cannot be Hitlers or Mussolinis, to rule as Mediaeval monarchs, they can at least try, and failing, hope for cabinet posts and shining uniforms. Let us not be so naive as to think that thirst for power vanished with the Roman Empire or persisted only in the German nation. And when we hear the glowing promises of the new orders and the newer deals which are being thought up for our future happiness under allwise administration of our governmental and economic affairs, let us not forget our irritations and occasional exasperations when we were as cheerful and tolerant as possible in accepting wartime controls as necessary.

Lost Little by Little

The great majority of Americans unquestionably treasure their liberty and do not mean to surrender it. But many of them are allowing themselves to be deluded into giving up a little of it here and a little of it again, in response to promises of social benefits of new orders, which however must culminate in an ultimately all-powerful state wiping out personal liberties.

For those who are seriously concerned over this increasing jeopardy of liberty in America, there is offered a light in the darkness. The salvation of American liberty lies in the truth, which makes men free.

The economics of life in an advanced civilization is complicated, and the answers to the old and new problems that confront us frequently are not simple. Regardless of our formal schooling, we all necessarily must know something of the fundamentals of economics. But even our college graduates and many of our highly educated specialists get into trouble in trying to diagnose some of the special problems of our modern economics. As a nation we are not grounded in the science of economics sufficiently to keep from falling into errors in economic thinking. Our schools and our colleges perhaps have failed to equip us adequately. And we may be led too easily to erroneous conclusions by disarming language, false promises, and oversimplification of issues involved. If we are thus led to favor too many false propositions, for lack of economic and political understanding, we may be lured ultimately to the end of our liberties.

If we would turn America off the road to bureaucracy and tyranny, we can best do so by not only attempting to improve our own understanding of economic problems but also by encouraging and promoting such understanding among all the people.

Many oil men probably feel a keen desire to see something done toward providing the nation with better understanding of economic and political matters and thereby toward thwarting the public enemies who seek their ends through falsification of economic truths and through deception.

FEE Leaders

One avenue for action toward wider economic education already is offered in the efforts of the Foundation for Economic Education, Inc. Trustees of the organization include such men as David M. Goodrich, chairman of the board of The B. F. Goodrich Company, New York; E. P. Halliburton, president of Earle P. Halliburton, Inc., Duncan, Okla.; A. C. Mattei, president of Honolulu Oil Corporation, San Francisco; B. E. Hutchinson, chairman of the finance committee of the Chrysler Corporation, Detroit; W. C. Mullendore, president of Southern California Edison Company, Los Angeles; Charles M. White, president of Republic Steel Corporation, Cleveland; several newspaper men, several prominent university professors, and others. Officers are headed by Goodrich as chairman.

As rapidly as financial resources permit, the Foundation proposes to undertake well-rounded activities including the following:

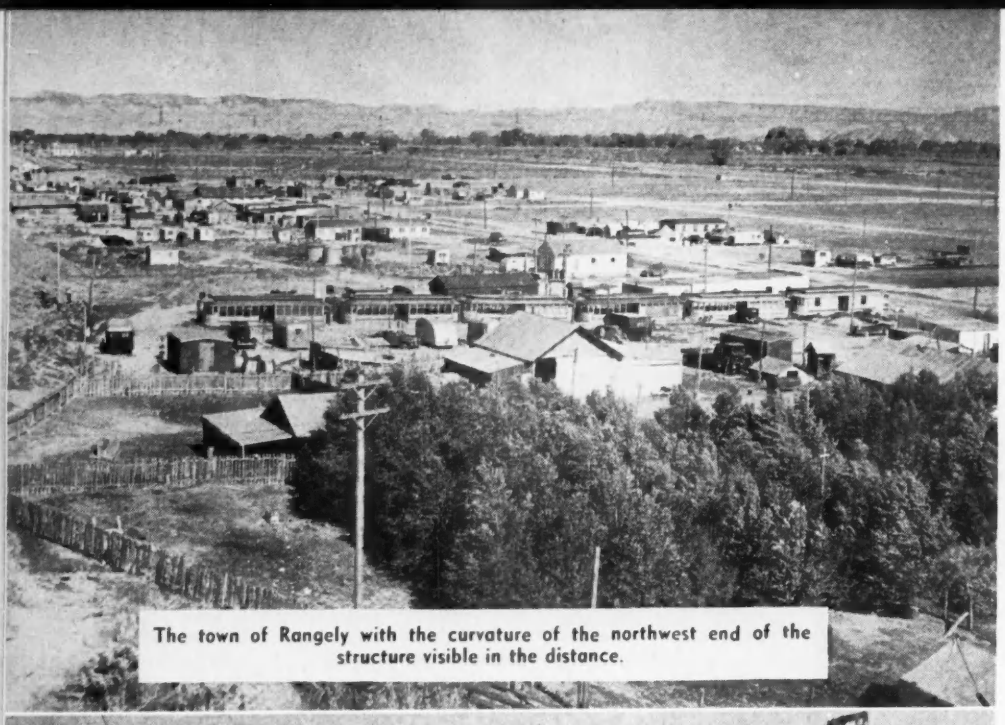
(1). Preparation and distribution of popular but thorough studies of current economic problems of major importance. (2). A lecture institute for developing informed leadership in voluntary enterprise. (3). A periodic journal devoted to economic and political discussions. (4). Financial and staff assistance to writers and publishers interested in promoting understanding of the meaning and conditions of economic liberty. (5). Abridgement, publication and distribution of classical economic and political works, such as "The Wealth of Nations" and "The Federalist Papers."

(6). Assistance in the preparation of appropriate monographs and books suitable for use in high schools and colleges. (7). Promoting distribution of worthwhile material published by other instiutions and individuals. (8). Cooperative arrangements between industry and professional students of economics to provide such students with practical experience in and knowledge of private business. (9). Organization of local study groups throughout the nation. (10). A nationwide radio program designed to combat economic fallacies, present basic economic facts, and promote sound thinking along economic lines.

Those who wish to oc-operate in this program, including those who desire to extend financial support are asked to write for further details to Leonard E. Read, president, The Foundation for Economic Education, Inc., Irvington-on-Hudson, New York.

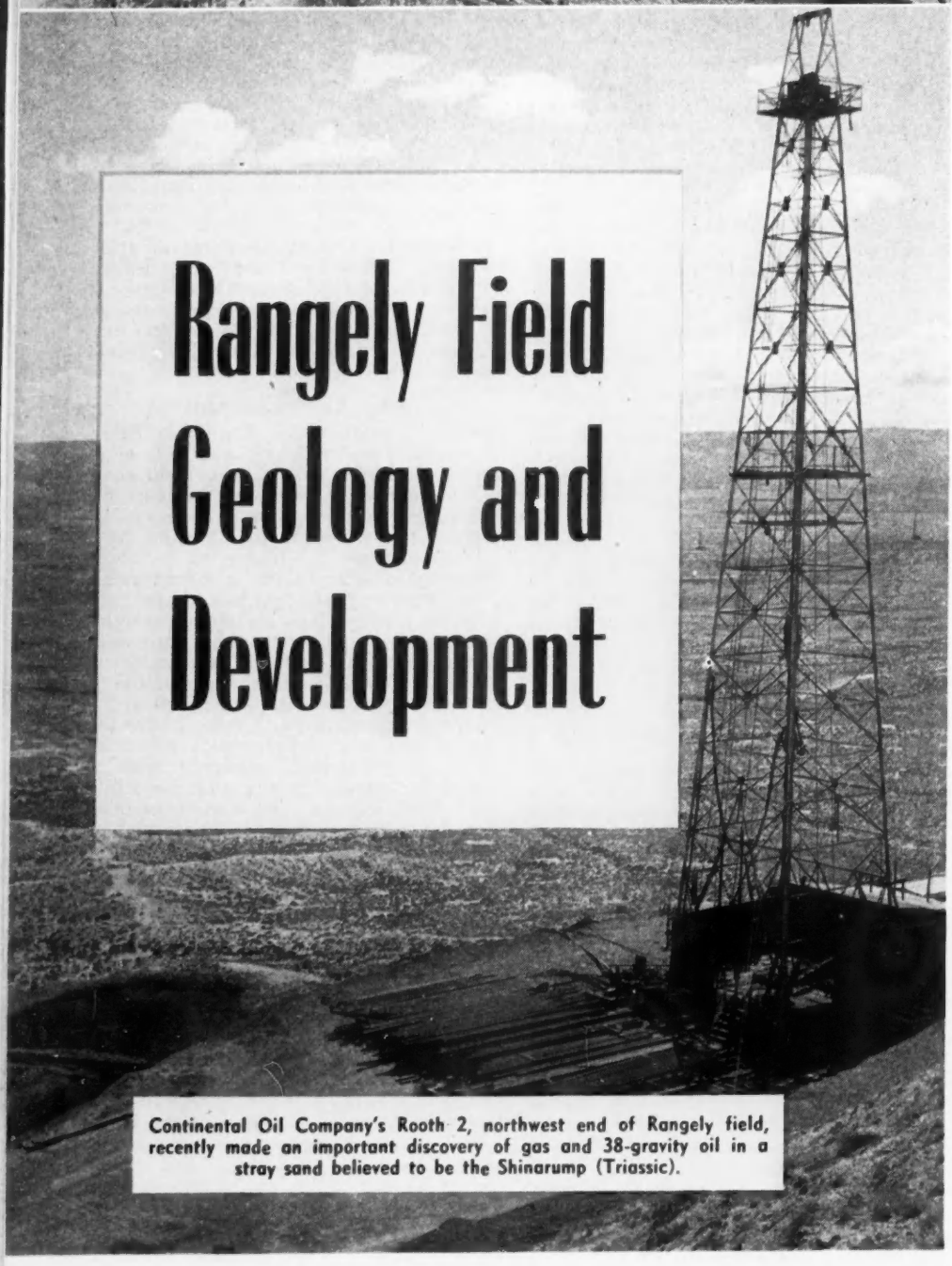
First Accomplishment

The Foundation for Economic Education already has issued the first of a series of popular essays on current economic problems. Among the current proposals for further restriction of individual enterprise is the demand that government should intervene in labor disputes to bring about a closer relation between wage rates and an employer's profits. The foundation sought the truth as to what this proposal means for wage earners and salaried workers, for consumers, for employers and investors, for the American form of government. Fred Rogers Fairchild, Knox Professor of Economics Emeritus at Yale University, answered with a booklet entitled "Profits and the Ability to Pay Wages." In it are presented the dangers to everybody concerned in a policy under which wage rates would be determined by ability to pay and under which efficiency necessarily would be penalized. The subject is not an academic one but one of practical and immediate significance, since it has been raised into prominence in recent labor union demands and since the theory appears to have been accepted by the President of the United States and the federal administration. In it lies the possibility of still another sacrifice of liberty for the American people. Yet this is only one of the many dangers which make up the menace of the "managed economy," and which must be put under the searching light of scientific examination if grave mistakes are to be avoided.



The town of Rangely with the curvature of the northwest end of the structure visible in the distance.

Rangely Field Geology and Development



Continental Oil Company's Rooth 2, northwest end of Rangely field, recently made an important discovery of gas and 38-gravity oil in a stray sand believed to be the Shinarump (Triassic).

By BERNARD M. BENCH
Geologist, Denver

EIGHTY-TWO Weber sand producers and 46 drilling wells mark the present development of deep production in Rangely field since 1943, when The California Company's Raven 1, Weber discovery, was opened for production after standing idle ten years. This most notable recent addition to American oil reserves, located in Rio Blanco County, northwestern Colorado, is expected to cover in excess of 25,000 acres. The Salt Creek field, Wyoming, in comparison includes about 27,000 acres.

In consideration of its lateral extent, the initial production of its wells and the thickness of its producing sands, Rangely is one of the most important fields in the Rocky Mountain area. To date there is only one failure, Newton Oil Company's Cobb-Stringer-Newton Government 1-D in 4-1N-102W at the south extremity of the field. Estimates on total ultimate recovery run from 5000 to 25,000 barrels per acre.

The best wells occur on the north and northwest parts of the structure. Some of the wells, particularly to the southeast, require shooting to induce flow and approximately one-sixth of the wells in the field have been shot. All producing wells are flowing, but a few wells on outer fringes are soon to be provided with pumping equipment. Weber oil is a dark brownish green of 35 gravity. The gas is unusual in that it contains up to 27 percent nitrogen.

Rangely surface elevations average 5300 feet and the average Weber sand well depth is 6300 feet. Wells on the crest of the structure have established the gas-oil contact at a subsea depth of 320 feet and the oil-water contact has been found at approximately minus 1160 feet by Continental Oil Company's Rooth 1, 15-2N-103W, at the northwest end of the field, and by Algord Oil Company's Guiborson Fee well, 18-2N-102W, on the north flank. These two wells are cutting from 5 to 7 percent water.

Operators in the field have formed the Rangely Engineering Committee, headed by J. J. Zorichak, for the exchange of information and coordination of producing and engineering activities. Under the committee arrangement, 11 wells are to be cored in various parts of the field during the next six months. Core analyses for porosity, saturation and permeability determinations will be conducted in the field by Core Laboratories of Dallas. The work of the committee should aid in solving many problems dealing with optimum drilling depth and production and provide a much better knowledge of potentials and characteristics of Rangely, including the maximum ultimate recovery.

Rangely History

The Rangely structure was recognized prior to 1900 as having possibilities for oil production, yet because of its then excessive drilling depths and its remoteness from refining centers and railheads, the development was delayed for nearly 50 years. The actual presence of oil was first discovered through oil seeps in a spring near the northwest corner of 5-1N-102W. Other seepages occur in canyons on the flank of the structure south of White River. The Poole well, SW SW NE 33-2N-102W, was drilled

in 1901-02 with the Dakota as the objective. This well reached 2130 feet after encountering a few barrels of production per day in the Mancos shale at 750 feet and oil shows around 1700 feet.

The Requina well, SE SW 21-2N-102W, also completed in 1902, encountered an oil showing at 480 feet from shattered zones in the shale. This encouragement led to intermittent prospecting and approximately 12 wells were drilled between 1902 and 1907. The first well below the Mancos shale, NWc 16-2N-102W, was also drilled during this period and reached about 3700 feet.

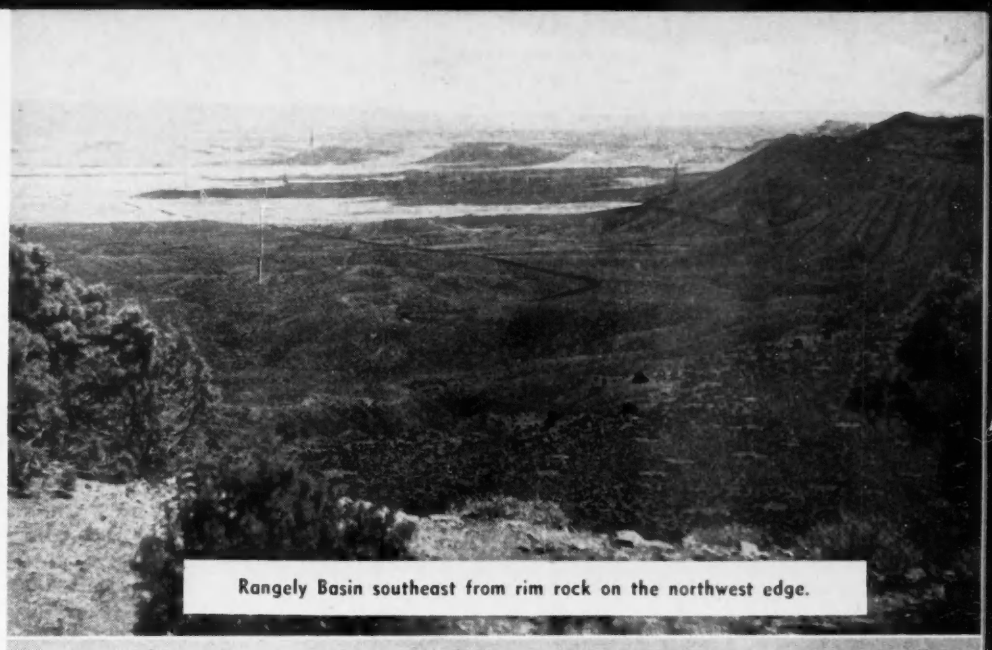
Production of 130 barrels per day was obtained in 1919 by Emerald Oil Company in SE NW 31-2N-102W from Mancos shale at 521 feet. To date, 350 to 400 shallow wells have been drilled in the Mancos, about one out of eight finding production of a few barrels daily to more than 100. Approximately 27 of these shallow wells at the present time produce commercial oil which is a paraffin base crude of about 41 gravity.

Early in the history of the field, oil was frequently obtained from depths of 600 feet and less but this shallow oil is now apparently depleted and at this time most of the wells are drilled from 1000 to 1800 feet. The oil appears to occur in cracks and crevices of the Mancos shale. Calcite overlies these veins and is penetrated in all instances where oil is discovered. This zone is free of water and but little gas is dissolved in oil, and since pressures are rather low, all production is obtained by pumping. The shale resists sloughing and caving to a remarkable degree and no casing is required other than one or two joints of conductor pipe.

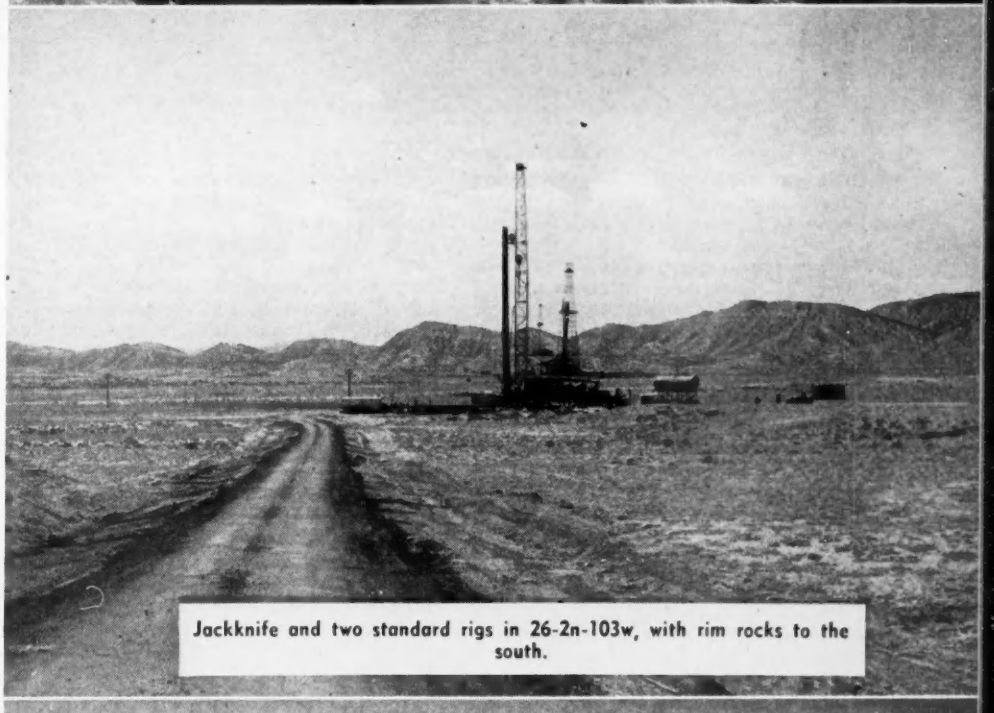
Previous to the drilling of the California Company's Raven 1, all Rangely wells bottomed in the Mancos shale except approximately eight, which continued into the Dakota group and deeper. Heavy flows of gas were encountered in the Dakota sandstone by three wells in the S½ Sect. 30, by one well in the NW Sect. 31 and by another in the SW 21-2N-102W, all of which were drilled from 1924-27. The largest yield was estimated at 74,000 Mcf per day but the gas soon drowned out by water. The first rotary well at Rangely was drilled by Associated Oil Company in SE 24-2N-103W during 1926 and was abandoned at 4772 feet after penetrating the Navajo sandstone. This test found the Dakota dry but encountered some oil saturation and gas shows in the Morrison. The Entrada was probably reached at about 4052 feet.

Raven's Record

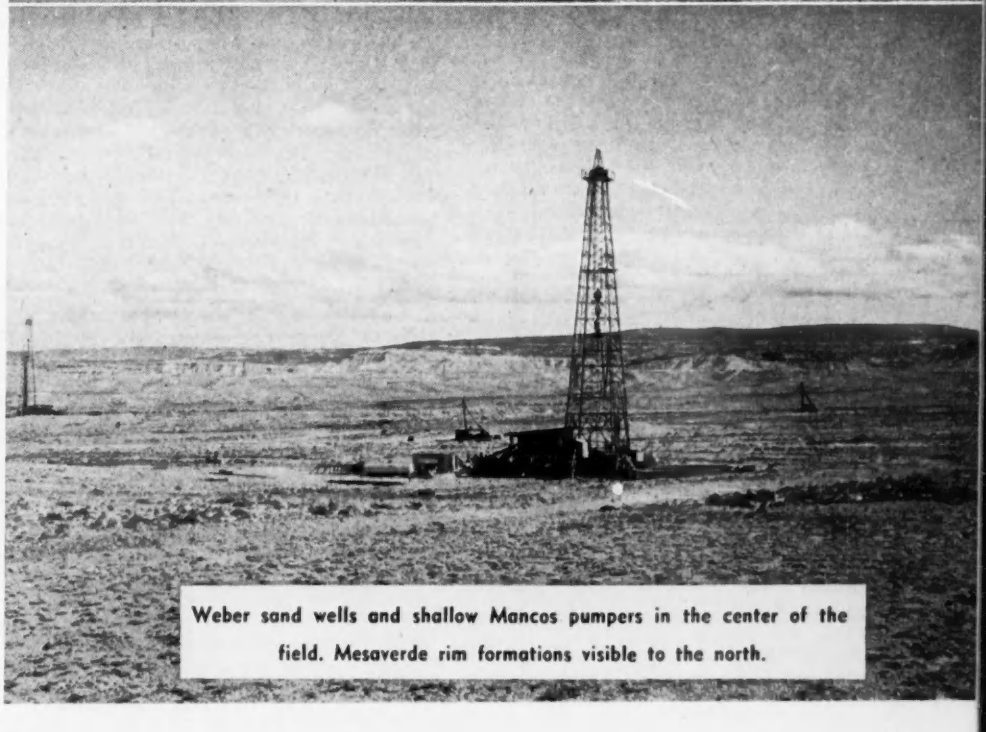
The California Company commenced Raven 1, NW SE 30-2N-102W, in 1931. This well was completed with rotary tools in 1933 at 7173 feet, having penetrated all the Mesozoic rocks below the Mancos shale and about 1500 feet of Pennsylvanian sediments. The Dakota and Nugget logged some gas and the first oil show was found at 5704 feet in the Weber sand of the Pennsylvanian series. The Weber was found generally to be a very hard, fine-grained sand with secondary cementation of calcite and silicia and with streaks of 30 percent oil saturation from 5704 to 6320 feet. After drilling and coring to total depth, the hole was plugged back and shot with 1800 quarts of nitroglycerin. The well produced about 8000 barrels in 1933 and was then shut in until September, 1943,



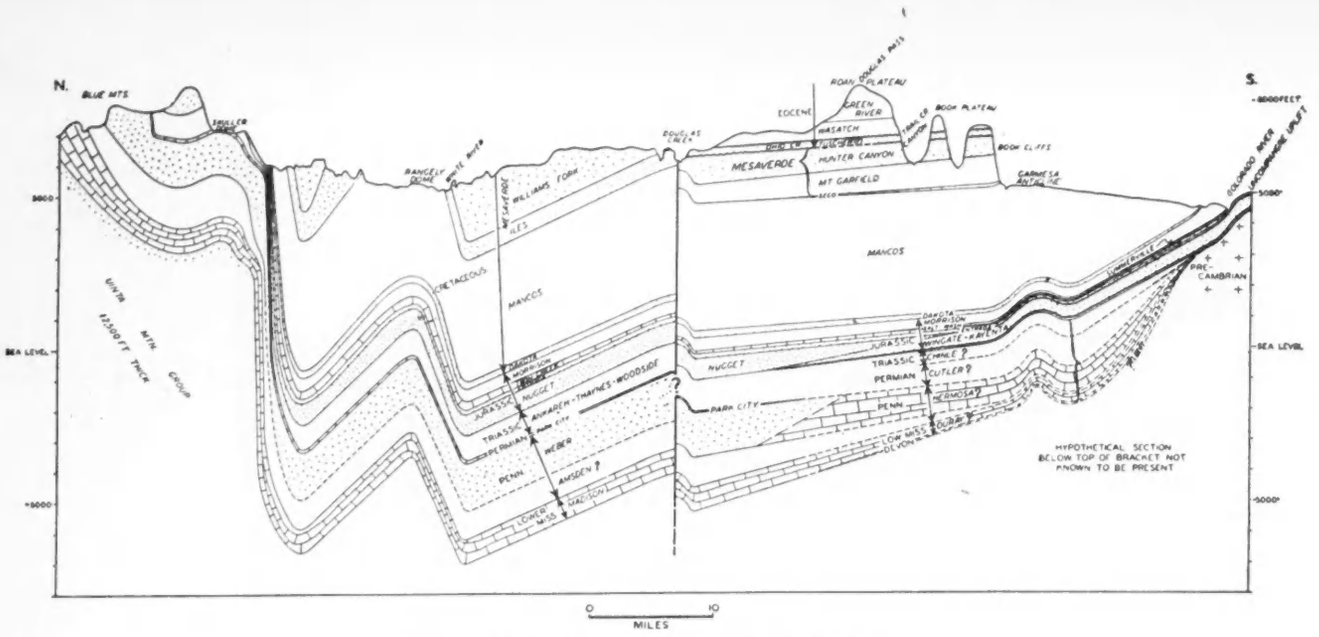
Rangely Basin southeast from rim rock on the northwest edge.



Jackknife and two standard rigs in 26-2n-103w, with rim rocks to the south.



Weber sand wells and shallow Mancos pumpers in the center of the field. Mesaverde rim formations visible to the north.



Generalized section across Uinta Basin, Colorado.
From AAPG "Possible Future Oil Provinces of U. S. and Canada."

when it was again placed on production and from that time to date has had a steady yield at an average rate of about 230 barrels per day.

The performance of Raven 1 and the necessity of developing reserves for the prosecution of the war gave immediate importance to Rangely. Invasion of the Japanese Islands was scheduled for November 1, 1945, and earlier in the year the PAW District 4, which included the Rocky Mountain area, was requested to furnish more oil beginning in October by 20,000 barrels daily. This large order was considered impossible by operators of the district without causing irreparable damage to existing fields unless Rangely could supply a substantial part of the increase. Although the war with Japan terminated shortly after the appeal for more production, this incentive, together with the desire of companies to increase their individual reserves, have been the major factors in the current drilling program at Rangely.

Topography of Field

The crest of the Rangely anticline is well marked by a topographic basin formed by the drainage of the White River. C. A. White, geologist for the Hayden Survey, who traversed the region in 1875 named the basin Raven Park. It is most aptly described as a desolate waste of dry washes and barren clay ridges, contrasting to the surrounding broken and more rugged country. The field, which derives its name from the town of Rangely, is ten to 15 miles from the Utah line, northwestern Rio Blanco County, Colorado. It is about 55 miles west of Meeker, Colo.; 55 miles southeast of Vernal, Utah; 120 miles from Craig, Colo., the nearest railhead; and 84 miles from Grand Junction, Colo.

The anticline is oval and asymmetrical, trending west on the east end and northwest on the west end, 20 miles long and eight miles wide. The axis in general strikes about N 70 degrees W. An escarpment rim averaging 500 feet in height borders the basin, facing inward toward the park center. Ridges dip away beyond the rim rock, rising in layers to cliffs of higher sandstone strata which circle the area in roughly concentric arrangement. The surrounding ridges are intersected by rocky canyons which drain into the basin. The park surface is very irregular with numerous hills and depressions. The larger portion of the park is north of the White River, which enters at the southeast end, flows along the southern margin, and leaves by a canyon to the west.

Structure

The Uinta Basin, which contains the Rangely anticline, is a major topographic and structural basin comprising about 15,000 square miles, of which approximately 7000 are in Northwest Colorado and 8000 in Northeast Utah. The basin measures some 175 miles from east to west and varies from 40 to 120 miles north to south. It is limited on the north by the Uinta Mountains, east by the rim rocks of Rangely and the Grand Hogback, south by the east-west extension of the Roan or Brown Cliffs, and west by the faulted Wasach Range. Small positive elements tectonically isolate the part in Colorado known as the Grand River Basin from the rest in Utah. Rangely anticline is midway between two similar folds all displaying unusual features of similarity and relationship in their trends nearly east and west across the basin. The anticline to the north is the Midland uplift which exposes Carboniferous strata. Douglas Creek flexure is to the south, with Mesaverde rocks on the surface.

The Rangely structure is a simple anticline, the crest of which has been eroded from the soft, uplifted Mancos shale which forms the Raven Park basin. It is surrounded by a high rim rock of one of the more resistant sandstones of the lower part of the Mesaverde formation. The lowest closing contour on the surface encircles an area of over 100 square miles and indicates structural closure in excess of 2100 feet. The steeper dips are on the southwest flank, increasing from 13 degrees near the axis to over 21 degrees at a point 1½ miles from the crest. Northeast flank dips average six degrees.

The fold flattens at both ends of the structure and merges into the flexures of adjoining areas. To the northwest the flanks of the structure combine as the strata becomes horizontal and the axis of the anticline disappears near the Colorado-Utah state line. Toward the southeast the fold terminates in the flat Tertiary beds of the high Cathedral Bluffs escarpment. The narrow Red Wash syncline separates Rangely from the structure to the north.

The Midland uplift is of much greater magnitude than Rangely and has considerably more stratigraphic displacement. This anticline is asymmetrical and dips more abruptly to the south. It is joined on the north by the still higher and similar structures of the Uinta Mountain system and pitches downward to the west near the Utah line. To the east the axis parallels the trend of the Rangely anticline, then flattens and disappears in the gently dipping plateaus of Tertiary strata comprising the center of the Grand River Basin.

A narrow, steep syncline forms the boundary between Rangely and the broad low anticlinal structure of Douglas Creek to the south. Douglas Creek has far greater aerial extent but less amount of uplift than Rangely so that the strata exposed are principally those of the younger Mesaverde. This anticline extends westward to the state line, to the Book Cliffs plateau on the south, and terminates to the east at Cathedral Bluffs. A small topographic basin, eroded in the lower Mesaverde shale and exposing the oldest rocks on the uplift, exists near the West Fork of Douglas Creek. Although it has structural features similar to Rangely, a test drilled in 1943, probably into Mississippian beds, found commercial gas in the Dakota but the Weber sand dry. This structure is extremely faulted on the surface.

South of Douglas Creek is the northern margin of the Uncompahgre Plateau. The anticlinal structures of Midland, Rangely and Douglas Creek thus form a north-south series of uplifts, separating the Grand River Basin of Colorado from the Utah division of the Uinta Basin.

In the deeper parts of the Uinta Basin, probably 20,000 feet of strata

from Miocene to Cambrian are present. The oldest rocks in the region are found north of Rangely on the axis of the Uinta system. Carboniferous strata are exposed on the southern flanks of Blue Mountain and to the south more than 7500 feet of tilted Mesozoic rocks are visible. A similar thickness of Tertiary beds overlie these sediments farther south.

Cretaceous rocks of Mancos shale and the younger Mesaverde are the only formations occurring on the surface at Rangely. Dakota sandstone outcrops appear in the foothill ridges to the north.

The youngest sediments exposed in the Uinta Basin belong to the Uinta formation of Tertiary age and consist mainly of clays, shales and coarse sandstones. Many red beds are present, some of brilliant color. The thickness varies from 500 to 1000 feet across the basin.

The Bridger series is very similar to the Uinta in thickness and general characteristics with clays, shales and sandstones predominating. An unconformity apparently divides the Bridger from the Green River in places, for in the north part of the basin, the Bridger has been noted lying on older formations.

The Green River sediments are distinctive as high escarpments of chalky white cliffs, rising 1500 to 2000 feet above the valleys and well shown by the Book Cliffs and Cathedral Bluffs south of Rangely. Green River formations lie nearly horizontal and occupy undisturbed portions of the great basins.

The lower Tertiary beds are composed of clays and marls of bright and variable colors, a mass several thousand feet in thickness. An unconformity separates the base of the Tertiary from the top of the underlying Mesaverde, but as no change in the bedding of the strata can be detected since both formations contain alternating layers of similar massive sandstone, the exact position of the unconformity is difficult to determine.

The thickness of the Mesaverde at Rangely is approximately 2500 feet, although a measured section to the east shows over 5000 feet. This formation consists of massive sandstone alternating with gray to brown sandy shales and numerous beds of carbonaceous shale and coal. Prominent escarpment ledges and cliffs with sandstones of medium to coarse-grained texture, local cross-bedding and weathering near the surface to shades of yellow and red from oxidation of iron impurities, feature the outcrops.

The upper part of the Mesaverde, known as Williams Fork, is recognized as a separate member with its lower limit marked by the main group of economic coals. In many places the bottom of the workable coals can be traced by an outstanding white sandstone. The coal beds have been made conspicuous by burning, which has baked enclosing strata to shades of red and yellow and has hardened clay and shale to a flinty texture. Some beds have a black streak along the slopes.

The Lower Mesaverde, called the Iles formation, varies from 1000 to 1500 feet in thickness and is quite similar to the upper part except that massive and resistant sandstone beds are more numerous. Distinct cliff-forming sandstones lie beneath the principal coal group, followed by a thin bed of coal or shale. A mass of sandy shale 500 to 600 feet thick then rests upon the Rangely rim rock, a bed varying from 20 to 50 feet.

View to the south from Raven 1 discovery well (foreground) toward the old (left) and new (right) California Company camps.

Mancos Shale

The Mancos shale from which the Rangely basin is eroded is a homogeneous mass measuring 5200 feet in thickness. Since a part of the shale on the structure has been removed by erosion, the amount found in wells already drilled varies from about 2900 to 3400 feet. This section is characterized by clay shale interbedded with sandy layers, calcareous shale, thin beds of marly sandstone and concretionary limestone. Fresh shale specimens are usually dark and fine-grained with cross jointing and thin laminations. The calcite veins in the shale with which oil is associated strike northeast by southwest at angles of approximately 45 degrees with the axis of the structure.

Near the top of the shale where the Mancos grades into the Mesaverde, sandstone beds are more numerous. Toward the bottom of the Mancos, distinguishing and resistant sandstones and limestones appear alternating with the shale. A distinct division of the formation occcurs at the base, a 200-foot section of dense, black, slaty shale, which generally forms long, low valleys on the dip side of Dakota hogbacks. All wells drilled in the Rangely field thus far have started in the Mancos shale.

The Dakota sandstone is composed of alternating beds of sandstone, gray shale, hard siliceous conglomerate and some limestone. Its lithologic character manifests exceptional continuity and persistence and gives a definite separation of Mesozoic beds from formations below. The exposed section measures generally 45 feet of upper sandstone, 120 feet of middle shale, and 40 feet of lower conglomerate.

Rangely wells penetrate about 280 feet of fine-grained gray sandstone interbedded with gray and greenish gray shale. Two sandstone beds can usually be identified on electric logs and are designated the First and Second Dakota.

The Morrison formation consists of a mass of varicolored shale and clay with harder beds of limestone and sandstone. Occasional dark, cherty conglomerate appears. In the lower part of the formation are darker horizons, fine greenish sandstone and calcareous layers. The entire thickness is about 670 feet. A group of sandstones white and cross-bedded and conspicuous as a marker, form the limit of the varigated beds.

Jurassic beds below the Morrison are the 90-foot Curtis of dense, gray, limy shale, sandy limestone and fine-grained, dark gray, calcareous glauconitic sandstone and the Nugget Group consisting of the Entrada, 130 feet of light buff, friable, calcareous sandstone; Carmel, 70 feet of reddish sandy shale, dark, gray shale and calcareous sandstone; and the Navajo sandstone, 480 feet in thickness, salmon pink in color and fine-grained.

Triassic System

The Triassic system, although undifferentiated in this region, is probably composed of the Chinle, Moenkopi and Shinarump formations. The total thickness of the Triassic is about 820 feet and consists chiefly of interbedded varicolored shale, gray to brown fine-grained sandstone and a few beds of gypsum.

The Permian system is represented by about 130 feet of Park City or Phosphoria formation and is mainly white fissile shale and reddish shale with thin beds of hard limestone and fine-grained gray and yellow calcareous sandstone.

Underlying the Park City are beds of Pennsylvanian age, the uppermost of which is the Weber sandstone. In general, the Weber is 1200 feet thick and is composed mainly of gray and red sandstone, shale and conglomerate, in part arkosic. On outcrops about 35 miles north of the field, the formation contains massive beds of gray to buff fine-grained calcareous sandstone that is slightly petroliferous in places. The upper 300 feet at Rangely is a fine-grained gray to buff sandstone with three beds ten to 15 feet thick of shaly, micaceous red sandstone. Several oil-bearing beds, mainly buff colored occur in this upper

zone between 5704 and 6320 feet. The next 300 feet contain more red argillaceous sandstone alternating with white dolomitic sandstone and thin oil stained sands. The lower 600 feet are nonproductive and is composed almost entirely of red sandstone with dense limy streaks and thin gray and red shales.

Beneath the Weber is the Morgan formation. Raven 1 penetrated 308 feet of these Pennsylvanian beds which are described as fine-grained white to pink calcareous sandstone, red and gray shale and dense limestone.

Subsurface Structure

The Weber data available at the present time show reasonably close agreement with the surface structure as mapped by the USGS and others. The subsurface fold is apparently somewhat broader and flatter than that indicated on the surface, where possibly the projection of abnormal dips were used in control. Dips on the Weber sand south of the axis appear to be slightly less steep than drawn on the structural map contoured on beds exposed at the surface. The interval between the Dakota and the Weber thins about 20 feet to the south from a well in Section 18 to a well in 34-2N-102W, a condition which may account for maintenance of the structure southward to some extent before falling off abruptly as indicated by the surface contouring. An abbreviated log of Rangely's discovery well is shown in Table 1.

Faults of major importance are not known as yet to exist in the field proper, although a fault of great lateral extent traverses the northwestern part of the anticline at right angles to its axis in Townships 2 and 3 N, R103W. Whether this fault has any bearing on accumulation of oil remains questionable as wells have not been drilled on the western or downthrown side of this displacement.

Several normal faults and numerous joints containing calcite veins trend northeast near the crest of the anticline. Other northeast trending faults and one striking northwest break the exposed rocks on the southeast flank. Vertical displacement is usually less than 100 feet; however, the fault in 11-1N-102W has a drop of about 300 feet. The downthrow block is on the southeast side of all but two of the faults. The smaller faults are apparently epi-anticlinal.

The Cobb-Stringer-Newton well in 4-1N-102W, recently abandoned as to the Weber section, encountered peculiar conditions. The well struck a brecciated fault zone near the top of the Weber sand and apparently continued in this faulted area to the total depth of 6874 feet. Shattered and faulted material with gypsum and slight oil shows were found in the cores. Weber was entered below the oil-water contact of a minus 1160 feet found at the north and northwestern ends of the field, and water was encountered in this well at 6792 feet. The significance of these unusual circumstances will await further drilling in the immediate area. There is no indication to date of any large faulted displacement in the Weber in the main part of the field, although well control is still insufficient for certainty. Radial or dip faults do not appear to be present.

Structural Relationship to Accumulation

The Mancos shallow oil occurrence is evidently controlled by the fractured zones near the numerous calcite veins which occupy joints in the shale. The majority of the veins are found where the folding was most intense, near the top of the anticline. The general dip of the veins is eastward, parallel to the fault planes and joint cracks. The oil probably occurs in the crevices of the fractured shale and in the porous parts of the veins.

Mancos production is doubtless indigenous to this formation since the shale is an excellent source bed containing abundant remains of marine organisms and the oil is of a higher gravity than that occurring in deeper horizons. There is apparently no connection between Mancos oil and that of the Weber because numerous sands intervene. Weber oil is obviously due to anticlinal accumulation.

The oil-water contact has been established in the Weber at the north and northwestern parts of the structure, but development of the field has not progressed far enough to determine whether there will be an effective water drive. At any rate, water encroachment toward the axis will probably be extremely slow because of the low porosity and permeability of the Weber sand. No water of consequence has been encountered by any wells in the Weber, nor in the Pennsylvanian sediments drilled by The California Company's Ravin 1, except on the flanks of the structure.

In addition to the four hydrocarbon-bearing horizons, the Mancos, Dakota, Morrison and Weber, the untested Mississippian formations and the contact of the lowest sedimentary rocks with the basement complex are possibilities for deeper production at Rangely.

The producing zone in the Mancos ranges from 500 to 1800 feet. Oil is found at any point in this section and there does not seem to be a definite correlation from the productive zone in one well to the equivalent in another. A large part of the Rangely field remains to be investigated. While only one well out of about eight or ten finds production, the drilling and completion costs are very nominal, and one good producer will not only pay for several dry holes but returns a profit on capital invested.

A substantial flow of oil in the Morrison has been encountered in only one known instance. The Texas Company's 1-32, NE NE NW 32-2N-102W. This occurrence was either passed up in rotary drilling by other wells or else did not exist due to changing sand conditions or lenticularity. Although the Morrison is not expected to produce any great amount of oil at Rangely, it is possible that accumulation of oil in this formation may be of economic importance. Absence of oil in the Entrada is accounted for by the varying depositional conditions in different parts of the Jurassic seas. Continental Oil Company's Rooth 2, in 15-2N-103W, recently encountered a flow of gas with 38-gravity oil from a sand believed to be the Shinarump in the undifferentiated Triassic system. This stray sand at 6110 feet may prove to be an extremely important discovery.

The Weber formation is considered the equivalent although somewhat younger than Tensleep, which has produced a great deal of oil at Wertz, Elk Basin, Garland, Oregon Basin and Lost Soldier fields, Wyoming. Recent evidence indicates that the productive horizons of the Weber formation at Rangely may include in part some of the Embar formation of Permian age. Below the Weber gas cap, the sands are tight, of low porosity and permeability, all of which appear to be indicative of long life wells.

Production

Weber sand well potentials range from between 100 to over 1000 barrels per day with an average production of 300 to 400 barrels through open tubing or on ¼, ⅜ and ½-inch chokes. According to Rangely Engineering Committee recommendations, the average well production is not to exceed 325 barrels per day. The gas-oil ratio for Weber sand wells averages 250-300 cubic feet. Including variable shallow production of 500-1000 barrels, the average daily production for the field during June, 1946, was approximately 26,000 barrels. The higher gravity Mancos oil is batched and transported through the pipe line at convenient intervals.

Accumulative total shallow Mancos oil production is in excess of 2 million barrels, with the annual production of oil from 1919 to 1938 varying from a low of 10,000 to a maximum of 33,000 barrels. In 1939 and 1940, Mancos production from the field exceeded 100,000 barrels; in 1941, over 200,000 barrels; in 1942, 1943 and 1944, over 300,000 barrels per year; and in 1945, over 400,000 barrels.

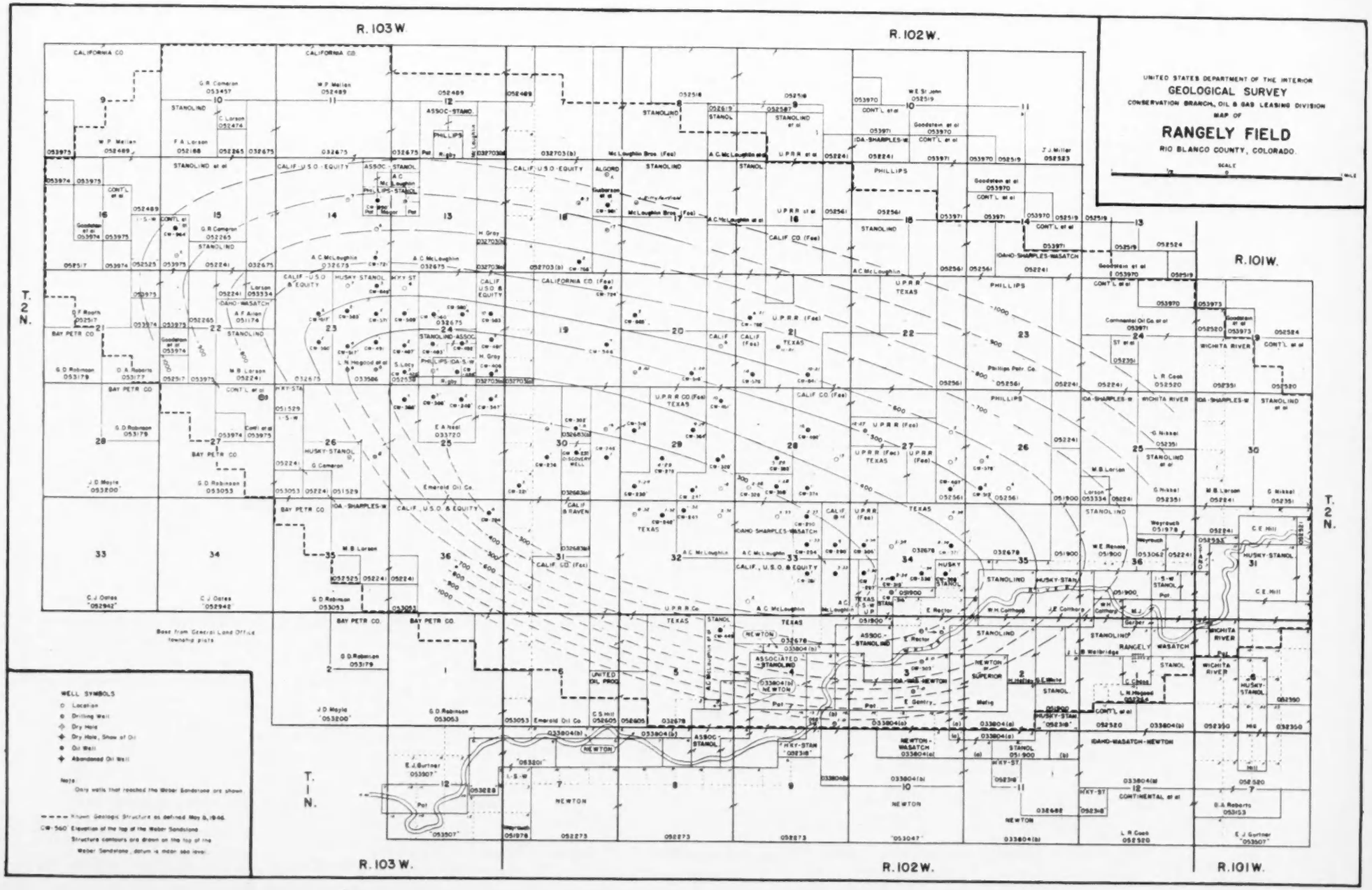
One well in the center of 40-acre tracts for Weber sand wells has been

TABLE 1

Abbreviated Log of The California Company's Raven 1, Discovery well of Rangely Field

(From USGS Oil & Gas Investigations, Preliminary Map No. 7)

Formation	Description	Thickness (Feet)	Depth (Feet)
Mancos shale	Gray to dark gray shale, grading downward to black, calcareous shale. Contains a few thin beds of fine-grained sandstone and siltstone.	2970	....
Dakota sandstone	Fine-grained gray sandstone interbedded with gray and greenish gray shale.	280	2970
Morrison formation	Green and varicolored shale, white and sandy limestone and limey sandstone.	670	3250
Curtis formation	Dense gray, limey shale; dense sandy limestone and very finely grained, dark gray, calcareous glauconitic sandstone.	90	3920
Entrada sandstone	Light buff, friable calcareous sandstone containing frosted and rounded grains.	130	4010
Carmel formation	Red to brown sandy shale; dark gray, fissile limey shale; and very fine-grained, calcareous buff sandstone.	70	4140
Navajo sandstone	Salmon-pink, very fine to fine-grained sandstone containing rounded and frosted grains.	480	4210
Triassic (undifferentiated)	Interbedded, red, gray, and green shale; gray to brown very fine grained sandstone; containing a few thin beds of gypsum.	820	4690
Park City formation	White fissile shale and red-brown shale, containing thin beds of hard limestone and very fine to fine-grained gray and light-yellowish calcareous sandstone.	130	5510
Weber formation	Upper 300 feet consists of fine to very fine-grained gray to buff sandstone containing three beds, 10 to 15 feet thick of shale, micaceous red sandstone; parts of the entire sequence are limey. Lower 1150 feet is similar to top 300 feet with increase in red beds downward. Several oil-bearing beds which are mainly buff-colored occur between 5704 and 6320 feet.	1450	5640
Pennsylvanian (undifferentiated)	Very fine-grained white to pink calcareous sandstone; gray and red shale; and beds of dense limestone.	83	7090 7173 TD


UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CONSERVATION BRANCH, OIL & GAS LEASING DIVISION
MAP OF
RANGELY FIELD
RIO BLANCO COUNTY, COLORADO.
SCALE
1 MILE
R. 103 W.
R. 102 W.
R. 101 W.
T. 2 N.
T. 1 N.
WELL SYMBOLS
Location
Drilling Well
Dry Hole
Dry Hole, Show of Oil
Oil Well
Abandoned Oil Well
Only wells that reached the Weber Sandstone are shown
Khuen Geologic Structure as defined May 8, 1946
Elevation of the top of the Weber Sandstone
Structure contours are drawn on the top of the Weber Sandstone, datum is mean sea level
Base from General Land Office township plats
CALIFORNIA CO.
STANOLIND
PHILLIPS
BAY PETR CO.
HUSKY STANOL
CALIF. U.S.O. & EQUITY
IDA-SHARPLES-W
IDAHO-SHARPLES-WASATCH
TEXAS
NEWTON
WICHITA RIVER
RANGELY WASATCH
IDAHO-WASATCH-NEWTON
CONTINENTAL
EMERALD OIL CO.

generally adopted throughout the field. Some operators are drilling outside locations which will average one well to 80 acres, but eventually such tracts will be drilled to 40-acre spacing. Offsets and lease obligations to insure adequate drainage will require closer drilling in places. The cost of these wells varies from a minimum of $100,000 to over $250,000 with an average of $125,000, and this factor will ultimately decide the degree of spacing.

Mancos wells do not follow any spacing pattern, as they are drilled along fractures and calcite veins wherever shallow well operators hope to encounter production. The cost of Mancos shale wells average about $2.50 per foot.

Drilling Practice

The drilling and completion time for Weber wells to the average depth of 6300 feet is from 100 to 115 days. Nearly two years were required to complete Raven 1 with the rotary equipment available in the early thirties to 7173 feet. Recent deep wells have all been rotary drilled.

Three distinct sections comprise the drilling of Weber wells: (1) 3000 feet approximately of Mancos shale, (2) 2600 to 3000 feet from base of Mancos to Weber and (3) the producing zone. About 275 feet of the uppermost part of the Weber has been found to contain 80 percent of the oil and the next 275 feet 20 percent. Some operators follow the practice of drilling only 500 feet into the Weber. One major company's policy is to drill either 735 feet into the producing zone or to a minus 1100 feet, whichever depth is first attained, depending upon structural position in order to complete wells safely above the oil-water contact at a minus 1160 feet.

A uniform casing program is not possible since some wells require an intermediate string in the Mancos shale section to maintain circulation while others are completed without it. In general, however, operating practice calls for 60 to 200 feet of 13⅜ to 17¼-inch surface pipe and 500 to 2650 feet of 10¾-inch pipe at the lowest point of lost circulation in the Mancos shale.

The Mancos provides comparatively easy drilling, but requires the most time due to mud loss since the shale over a considerable portion of the field contains crevices and fractured zones. Wells that encounter lost circulation zones are drilled as deep as possible before running the intermediate string. Troublesome fractures often open after initial sealing and result in complete loss of mud, which accounts for total commercial mud costs of $12,000 to $15,000 per well. The mud weight is limited to 8.6 pounds per gallon to minimize the differential pressure and thus avoid as much as possible the opening of fractures. Fibrous or cellulose material is added to the mud system when circulation loss occurs, but if the fractures are not sealed, the wells are then cemented.

One operator favors the drilling of a 9-inch hole through the shale section and the reaming and setting of 8⅝-inch pipe in case fracture zones are encountered. Where intermediate strings are necessary, sufficient cement is pumped around the casing shoe to rise behind the pipe to the surface, but in cases where complete circulation to the surface is not achieved, cement is inserted into the casing annulus by one-inch pipe to insure completeness of the seal. Very close weight control is necessary in drilling the shale section, for fractures tend to deflect the bit and deviation surveys are therefore made every 50 feet. Mancos shale section drilling price is $11 per foot and contractors are paid for loss of circulation and correction time after 72 hours at the rate of $650 per day.

A strong flow of gas which caused several blowouts was originally encountered 30 feet below the top of the first Dakota sand but this has now been drowned out. Artesian water, however, in the second sandstone member of the formation which attains a head of about 250 pounds per square inch, is very difficult to control and this is confined by weighting of the mud. A very fine balance of mud weight is essential because of the danger of breaking into fractured zones in the uncased section when mud weight is high enough to retain the water flow. Mud weight of 10.6 pounds per gallon gives maximum safety in confining the water, but the weight must be limited to 9.8 to prevent circulation loss. In recent practice, the weight is slowly built up to 9.8 pounds when about 100 feet above the Dakota and the formation is successfully drilled by vigilant consistency control.

TABLE 2

Analysis of Heavy Weber Crude from The California Company's Raven 1, Rangely Field Discovery Well

(From USGS)

Specific Gravity at 60 °F.	0.848
Percent Sulphur	0.72
Saybolt Universal Viscosity at 70 °F.	53 secs.
Saybolt Universal Viscosity at 100 °F.	46 secs.
Cleveland Open Cup:	
Flash: Below 60 °F.	
Fire: Below 60 °F.	
API Gravity at 60 °F.	35.4
Color	Brownish Green
Pour Point	Below 5 °F.
Carbon Residue of Crude	2.69 Percent

Approximate Summary	Percent	Sp. Gr. 60/60 °F.	Deg. API 60 °F.
Light gasoline	5.4	.706	68.9
Total gas and naphtha	24.6	.747	57.9
Kerosene distillate	11.2	.812	42.8
Gasoil	14.5	.849	35.2
Nonviscous lubricating distillate	13.0	.864-.895	32.3-26.6
Medium lubricating distillate	7.3	.895-.923	26.6-21.8
Viscous lubricating dist.	.....	.....	.....
Residuum	25.8	.958	16.2
Distillation loss	2.6	.....	.....

90-100-Octane Aviation Base Stock: Not present in this crude.
80-Octane All Purpose: Yields 18 to 20% by selective refining or desulphurization to increase lead susceptibility.
72-Octane Motor: Yields of 30% straight run and 29% cracked gasoline obtainable; lead costs higher than average.
Burning Kerosine: Yields of 20 to 23%; treatment for reduction of sulphur necessary.
Diesel Fuel: Yields of 28 to 32% meeting specifications probable.
Fuel Oil: From 35 to 60% of crude can be used as fuel oil depending upon overhead products desired.
Asphalt: Estimated at 14 to 16% of 100 penetration product.
Lubricants: Present but treating cost probably excessive.

Drilling Time

The formations from the base of the Mancos to the top of the Weber require 35 to 40 rock bits and 30 to 35 days drilling time. This section is rather easy to control except for the red beds, 400 to 500 feet thick and topped at depths from 4700 to 5600 feet. About 100 to 125 sacks of anhydrox of barium carbonate are usually necessary to condition the mud, which is contaminated by the anhydrite and gypsum.

The Weber gas cap occupies a small area near the crest of the structure and the gas-oil contact at a minus 320 feet is probably less than 75 feet below the highest point. A seven-inch oil string is run about 50 feet into the Weber to be certain of a gas shutoff where wells encounter the gas cap or is set immediately on top of the Weber where wells are below this cap. This depth varies from 5400 to 6000 feet. The pipe is cemented with 800 to 1300 sacks, sufficient to reach behind the casing to above the Dakota to shut off any formation water, minimize possible corrosion, to prevent differential pressure between the strings of casing, and to protect the potentially productive Morrison just below the Dakota.

A 6⅛-inch hole is drilled into the oil sand and unusual care must be observed to protect the Weber from contamination by drilling mud or water infiltration because of the low permeabilities and the hardness of the formation with retards drilling and lengthens exposure time to the drilling fluid. To prevent this, operators use either a low water-loss mud or an oil base drilling mud while penetrating the Weber section.

With water-mixed mud, a gel clay of high colloidal characteristics forms the base and low water-loss is attained by the use of starch products. This constituent necessitates some caustic to raise the pH to about 12 for prevention of fermentation and this together with quebracho comprises the main treatment. The mud is restricted to a maximum water-loss of 3 cc in 30 seconds at 100 pounds per square inch and to a weight of 8.9 to 9 pounds per gallon which easily controls the relatively low reservoir pressure of approximately 2700 pounds per square inch.

Oil base drilling mud is used by some companies in order to avoid water logging and the sealing of sand pores. The necessary special preparations are usually made during shut-down periods. All mud tanks and ditches are covered to eliminate contamination to the system and steam generating equipment and coils in mud tanks are installed for the maintenance of proper viscosity. A typical mud consists of 300 barrels of oil base material such as talloil mixed with 500 sacks of oyster shell flour. The mud is controlled by addition of talloil to cut viscosity and by sodium silicate to raise it. Foreign water contamination is counteracted by adding brine.

Oil saturation occurs in zones of varying porosity and permeability distributed irregularly through the uppermost 550 feet of Weber. Permeabilities are 20 mil lidarcys or less and the average porosity is probably less than 20 percent of the total section. The entire Weber producing zone has been cored in only a few wells probably because of the restrictive cost of approximately $30,000 to $40,000. Contractor coring time is $650 per day. Furthermore, coring permits danger of partial closing of sand pores during the 40 to 50 days required. At the present time, more than 60 core heads are necessary to penetrate the section.

The drilling and completion of the Weber zone without coring normally takes 20 to 25 bits and from 15 to 25 days. Drill-stem tests are made in wells located in or near the gas cap after penetration of four or five feet into the Weber to determine effectiveness of the gas shut-off and any cement failures are corrected before drilling continues. When total depth is reached, the drilling mud is displaced through 2⅞-inch

production tubing. Some wells flow without treatment, but swabbing is generally necessary.

Wells that require shooting to increase production or to cause flow are shot with 80 to 1900 quarts of nitroglycerin, usually in solid form by several stages. Acidizing is not considered a successful means of treating Rangely wells for the wide variations in porosity and permeability may cause only one of the oil-bearing sands to properly respond. However, mud acids are extensively used to clean the sand face. Flowing tubing pressures are from 190 to 250 pounds per square inch while shutin casing pressures amount from 600 to 1075 pounds per square inch. Drilling water for deep wells is pumped from the White River which flows along the south side of the structure and water for shallow wells is stored in tanks or earthen reservoirs. Equipment is usually trucked 125 miles from Craig, terminus of the Denver and Salt Lake Railroad.

Oil and Gas Analysis

Rangely oil contains a comparatively high content of sulphur. Yet the gasolines are sweet and the sulphur remains in the residuum; therefore, this crude should be regarded as a sweet oil and refined for gasoline, kerosine and fuel oil. A total yield of approximately 60 percent of gasoline is obtainable. Treating costs are estimated slightly higher than for average sweet crude products. An analysis of heavy Rangely Weber crude is shown in Table 2.

Gas analyses from different Weber wells show considerable variation. Nitrogen content ranges from 11 to over 27 percent. The fractional record of a Rangely gas sample is shown in Table 3.

Land Status

The following companies hold practically all the deep operating rights in and near the immediate vicinity of the field: The California Company, Stanolind Oil & Gas Company, The Texas Company, Wasatch Oil Refining Company, Phillips Petroleum Company, Newton Oil Company, Continental Oil Company and Algord Oil Company. Approximately 60 percent of the acreage in the field proper is private land and is owned in fee simple, chiefly by The California Company, Union Pacific Railroad Company, Emerald Oil Company and the McLaughlin interests. The Union Pacific Railroad Company and The California Company own 3280 and 2710 acres, respectively. Mancos shale oil operators include Equity Oil Company, Raven Oil and Refining Company, Newton Oil Company, California Oil Group, Ltd., and United Production Company.

Public domain, state, school and Indian land with occasional privately-owned land along river bottoms and arable valleys is the land status within the Uinta Basin. Government land predominates. A year ago, the Department of Interior opened large tracts of Indian land to mineral exploration along the Colorado-Utah border, a great deal of which lies in the Basin.

Markets

A ten-inch pipe line completed in September, 1945, by Utah Oil Refining Company transports Rangely crude 150 miles to Wamsutter, Wyo., where it connects with the eight-inch line from Lance Creek, Wyo., to Salt Lake City, Utah. The Rangely line has a booster capacity of 30,000 barrels daily. The oil is now being refined in Salt Lake City, Utah; Cheyenne, Wyo.; Denver, Colo., and Whiting, Ind.

TABLE 3

Fractional Record of a Gas Sample Taken from Stanolind Oil & Gas Company's Husky Rector 1, Section 34-2n-102W, Rangely Field

Oxygen	0
Nitrogen	25.15
Carbon Dioxide	0
Methane	52.43
Ethane	9.36
Propane	6.15
Isobutane	1.66
N-butane	2.59
Isopentane	1.01
N-pentane	0.69
Hexanes plus	0.96
Gross BTU by Pod	1159
Specifici Gravity by Pod	0.887
Specific Gravity by Weight	0.888
GPM:	
Actual Pentanes	1.059
Calculate at 15 pounds	1.119
Calculated at 26 pounds	1.458

Vapor pressure of pentanes plus fraction is 12.31 pounds per square inch.

Before the introduction of the pipe line, oil was trucked for many years 210 miles to Salt Lake City. The Raven Refinery, a 250-barrel topping plant located in the field, is at present shut down, but the Equity Oil Company Refinery at Jensen, Utah, still processes a small amount of oil for local markets. Rocky Mountain papers have reported that a 735-mile pipe line may be constructed to carry Rangely crude to refineries in the Los Angeles area.

Future Developments

Facilities for transportation of oil and market conditions as well as future discoveries in the field will determine developments at Rangely. The present pipe line outlet is now nearly taxed to capacity and therefore the decision as to the proposed line to California is awaited with interest.

An estimation of producing possibilities and of the total yield is rendered difficult by the extreme variations in porosity and permeability across the field. However, it is widely believed that the wells will be long, steady producers. A great deal more will be known of the field potentials and of probable total production upon completion of the Weber coring program now in progress under supervision of the Rangely Engineering Committee.

Throughout the Uinta Basin, exploratory interest continues strong, particularly on the trends of the anticlinal structures. Seismic parties and gravity crews are busy in the general area. A wildcat location has recently been announced in 25-3N-104W, near Artesia.

Rangely is the only present producing oil field in the Unita Basin. Small amounts of shallow oil have been produced at De Beque, 75 miles southeast in Mesa County, but the field has now been abandoned. The Uinta Basin has never been extensively prospected because of the relatively great depths to significant formations, lack of conclusive surface evidence except for the larger anticlinal areas and the formerly poor markets. Most of the basin is blanketed by flat-lying Tertiary beds and deformation existing above post-Wasatch formations does not have much meaning.

Uinta Basin gas pools in addition to the Rangely field are White River, 30 miles east; Carbonera or Garmesa, 50 miles south; Piceance Creek, 36 miles southeast, and Douglas Creek, 25 miles south. Gas occurs in the Wasatsch and in the upper part of the Mesaverde at White River. The gas at Garmesa exists in the Dakota, Jurassic and Triassic formations and is approximately 50 percent methane and 50 percent carbon dioxide, the latter increasing in amount with depth. Piceance Creek gas is found at the Green River-Wasatch contact and also in the Wasatch, while at Douglas Creek gas occurs in the Dakota. All of these fields are shut in at this time for lack of pipe line facilities and markets. The Farnham, Woodside and Harley structures in Utah produce carbon dioxide chiefly; the latter two are important since the gas is rich in helium.

Fields to the northeast of Uinta Basin produce oil and gas, mainly from Jurassic and Cretaceous beds. Oil shale deposits, asphaltic sands and veins of solid hydrocarbons such as gilsonite are common in many parts of the area. The most extensive ozokerite deposits in the United States occur near Soldier Summit, Utah, and free oil has been found in Eocene strata within the Uinta Basin.

The writer is especially indebted to G. G. Frazier, United States Geological Survey, for maps and aid in the preparation of this article, to Rangely field operators and the bibliography listed below.

Coming Soon

"Progress of the Oil Search in Georgia," by Garland Peyton, director, Department of Mines, Mining and Geology of Georgia

Watch for It

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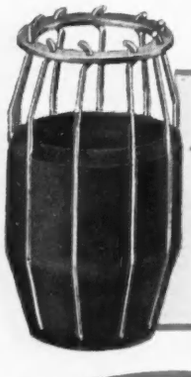

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Part 3

Types of Regional Structure (Continued)

By VINCENT C. ILLING,
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London, England

WHEN dealing with the accumulations in monoclinal and folded regions it was pointed out that in both these types of regional structure the presence of normal faults created effective traps by the dislocation of the permeable reservoir rocks and the sealing of their truncated edges by the impermeable cap rocks. This feature has for a long time been recognized as an important source of oil trapping, but there are some portions of the earth's crust where the importance of faulting becomes so dominant that it is recognized as being the main cause of the accumulations.

Where such regional conditions exist it seems better to consider them under a separate heading, more particularly as they give us an opportunity to concentrate attention on the effects of faulting on all types of oil accumulation. One of the best examples of the role of faulting in oil accumulation is the Balcones Fault region of Texas. This fault zone crosses the southeasterly dipping monocline of Comanchean Cretaceous and Tertiary strata. The faults are in the main roughly parallel to the shore of the Gulf of Mexico and the movement which has produced them is probably associated with the down-troughing of this whole area under the weight of sediments laid down in Cretaceous and Tertiary times.

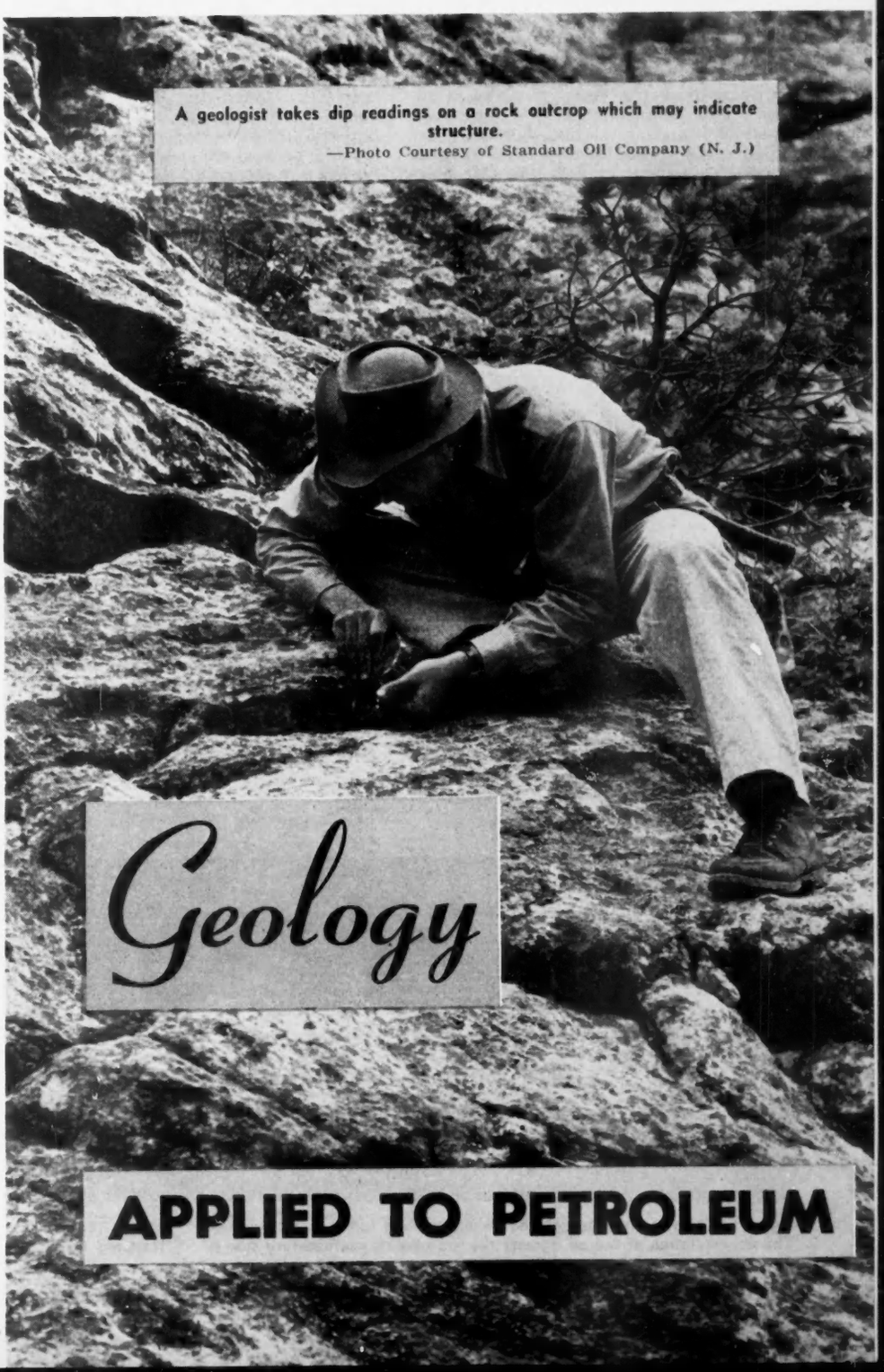
Associated with the main fault and complementary to it are a series of normal faults with down-throws in the opposite direction. It is these latter faults within the down-sunken area which form the traps for oil and gas. The latter probably migrated updip and could go no farther when blocked by the truncated fault faces.

While the mechanism of these oil accumulations seems to be adequately explained by this theory of lateral migration, there is some evidence to suggest that such fault planes can act in other ways, particularly by the inducement of considerable transformational migration along the fault fissures. Occasionally, the fracture zone itself contains sufficient porosity to be highly productive, but the dominant role of the fault in this particular region appears to be as a block to lateral migration. Thus, only one side of the fault, i.e., the upthrown or the southeastern side, contains the oil and gas accumulation. Such fields as Powell,[18] Luling, [19] and Mexia,[20] are good examples of this phenomena (Figures 7-8). The rocks may be disturbed near the fault into wave forms which give the structure a fold-like appearance. In spite of this, the fault, rather than the accessory folding, determines the boundary of the accumulation.

Oil Fields Associated With Salt Domes

Of the other structural accumulations of petroleum, by far the most important are those associated with salt domes. These curious and at first much misunderstood structures have been recognized as a class by themselves since Spindletop was discovered in 1901. Gas and oil may occur firstly in the sediments over the salt domes, secondly in the crestal region of the salt mass itself, or rather in the limestone cap rocks which often occurs just above the salt; and thirdly in the highly disturbed flank sediments which buttress against the salt mass. Sometimes, as in many of the accumulations of oil in the German salt dome area, the accumulation is some distance from the flanks, i.e., in the peripheral fault block which tend to occur around the salt intrusion.

The domes themselves are now regarded as being the result of intrusion of salt from deeply buried sedimentary salt masses. Salt is highly plastic when under considerable rock pressure, and in this plastic condition it seeks an exit en masse wherever the pressures on it are not uniform and at the same time the cover is insufficiently strong to withstand the pressure of the salt. The causes of the pressure probably can be ascribed to lateral earth movement (this is particularly so in the Hanover Basin) and also to the mere weight of an accumulating mass of sediments which renders highly mobile the salt on which they are laid. As the intrusion rises from its mother rock it tends to assume a cylindrical form, perforating the strata, upturning their edges and sometimes involving them in thrusts, which are symptomatic of the upthrust of the salt itself. The boundaries of these structures are usually steep. Sometimes they even become overturned, and in such cases the marginal oil fields which may be tucked in under the salt overhang (Barbers Hill[21] and Moreni[22]) give rise to the misconception that these are cases of oil accumulations under the salt mass itself. There is, however, only one



A geologist takes dip readings on a rock outcrop which may indicate structure.
—Photo Courtesy of Standard Oil Company (N. J.)

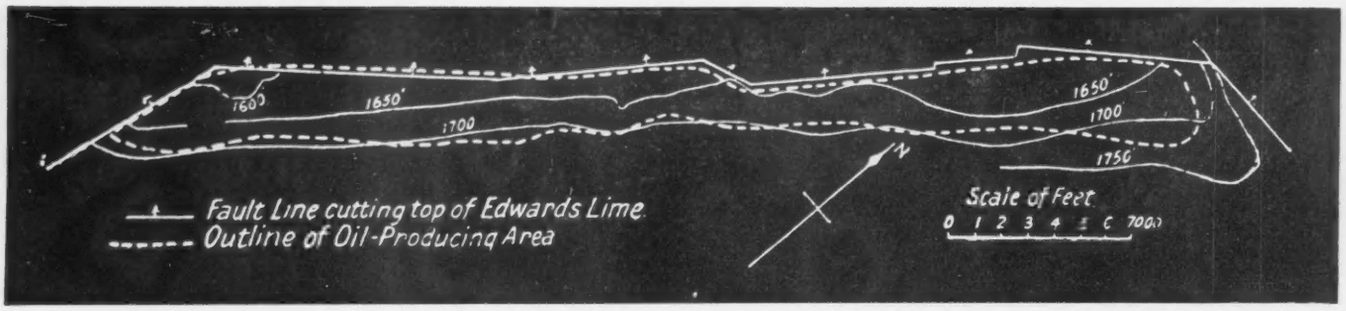


Figure 7. Stratum contour of the Luling oil field (after E. W. Brucks). The stratum contours are drawn on the top of the Edwards oil horizon and show heights above sea-level. The western boundary of the Luling pool is determined by the fault. The margin of the pool is not coterminous with the position of the fault at the surface because the fault shades to the east in the north and to the west in the south. The northern and southern ends of the pool represent the limits of the faulting. The eastern margin is mainly determined by the level of the edge-waters.

or two authenticated cases of an oil accumulation completely overlain by a large salt dome. One instance is the oil pool at Volkenroda in Thuringia[20], Germany.

It was originally supposed that the accumulations of oil associated with the salt domes were due to the formation of dome-like structures over the intrusion. This is no doubt one important cause of the accumulation, but more detailed evidence shows that even in these dome-like structures over the salt mass itself a considerable amount of faulting occurs and must have played its part in trapping the oil and gas. So far as the marginal accumulations are concerned, those which occur immediately on the edge of the salt can be ascribed mainly to the impermeability of this material producing an effective seal to further lateral migration. Those which occur some distance from the salt mass are usually fault traps, but occasionally they can also be due to conditions of unconformity which become accentuated close to the salt domes. Such areas are highly sensitive to the conditions of stress within the whole region.

In the Hanover Basin in particular it is common experience that disconformities which are only identified by broad regional studies in the area as a whole become so accentuated near the salt margins that they appear as strong unconformities and result in conditions of overstep and overlap which give local trap structures. The oil field west of the Nienhagen salt dome, one of the most important in Germany, is due to a combination of faulting and unconformity[21].

There is, furthermore, little doubt that a considerable amount of vertical migration of oil and gas has occurred around some of the salt domes, and it is quite possible that one of the contributing features to the richness of oil accumulations on the edges of these structures is the fact that the marginal faulting has induced so much transformational migration that the boundary traps have been fed from great thicknesses of underlying strata. It has even been suggested in the case of the German salt domes that the peripheral oil pools are due to the fact that the general blanket of buried salt has been perforated around the edges of the domes by the exhaustion of the salt used up in the formation of the salt domes. In this conception it would appear that the original source of the oil was in the underlying Palaeozoics below the salt, and it had merely escaped upwards along faults to be trapped on the edges of the salt masses. There does not, however, seem to be any necessity for an extreme view as this, as there are undoubtedly important source rocks in the Hanover Basin, both in the Jurassic and the Cretaceous. It is more likely that the oil originated within these formations and has accumulated in suitable structures provided on the salt dome margins.

However, areas of salt dome phenomena are always areas of thick accumulations of sedimentary rocks, and the intrusion of the salt domes associated with marginal faulting undoubtedly played its part in inducing transformational oil migration. This may explain the great accumulations of oil on their boundaries. While the super cap is confined to the immediate area above the salt, and the cap accumulations necessarily also show the same feature, the accumulations on the edge of the salt domes are exceedingly haphazard in their occurrence. Usually the oil is confined to a very small portion of the periphery. This results in many unsuccessful wells during the process of exploration and it is only the immense productivity of the marginal accumulations which compensate for the high percentage of failure in exploration.

Oil Fields of Unusual Types

Lastly among the various oil accumulations in the world we have a number of interesting cases where oil is associated with igneous intrusions, or where the oil in a solid form may exist in the form of dikes or sills. Similarity to igneous forms in these latter cases is certainly accidental and is due to the mobility of the bitumen when originally introduced. Where oil is closely associated with igneous rocks its occurrence appears to be due either to the fact that the igneous rock is the most porous reservoir available or to the disturbing influence of the intrusion and its associated metamorphism which induces porosity and permeability on the margin of the igneous intrusion. Occasionally around volcanic necks and bosses, the upturned strata truncated by the intrusion form an obvious trap for the accumulation, though the igneous rock itself is not usually sufficiently compact to be able to hold back large quantities of oil under pressure. Many of the oil pools discovered in Mexico in the early days were along the margins of igneous dikes and sills. In these cases it was often the presence of surface seepages of oil which had migrated along the edge of the igneous rock which gave the clue to the presence of the oil below.

The Cretaceous and early Tertiary section in Mexico is lacking in porous strata. Most of the formations are compact limestones, marls and clays, and it is probably the porosity produced by the igneous intrusions which has caused

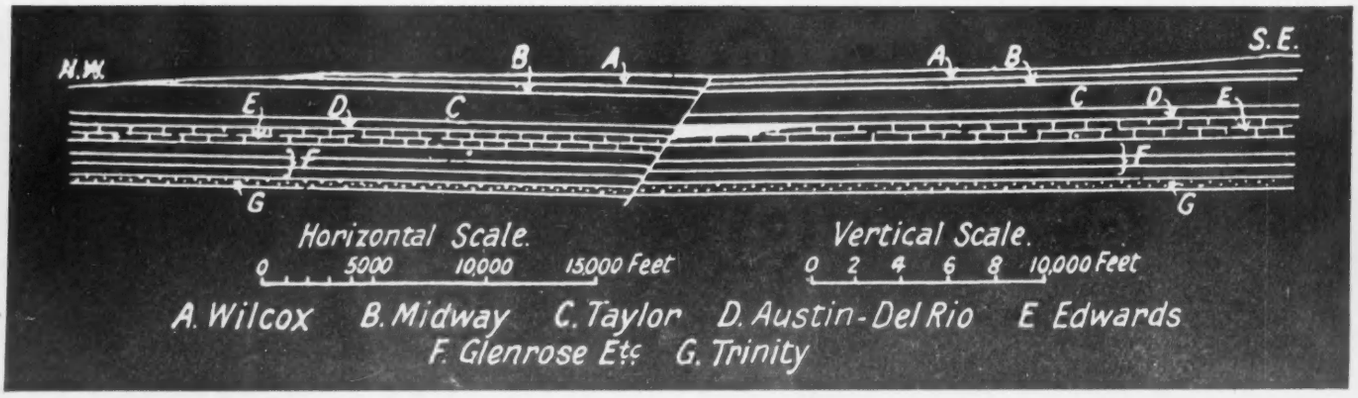


Figure 8. Cross-section through the Luling oil field (after E. W. Brucks). The accumulation of the oil against the fault on its southeastern side is due to regional migration of oil updip from the southeast, and to the trapping of the oil in the Edwards limestone against the fault plane.

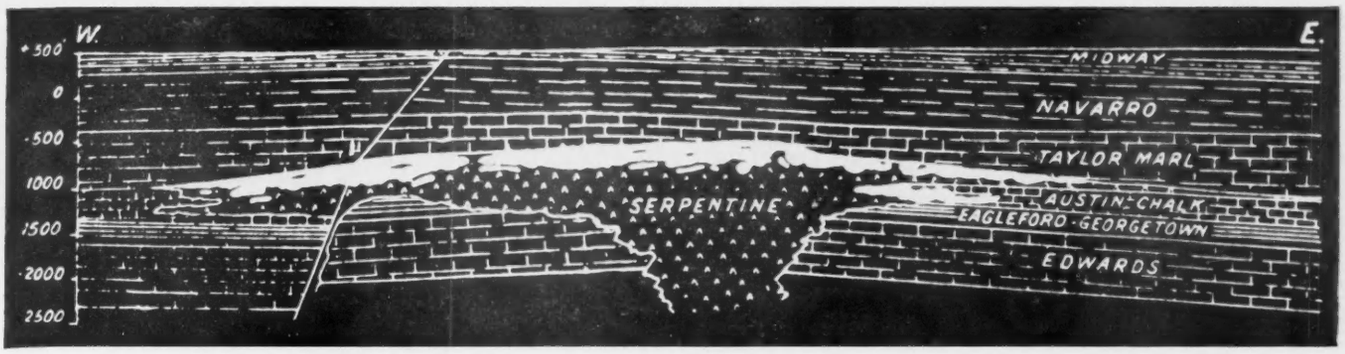


Figure 9. Cross-section of the Lytton Springs oil field (after D. M. Collingwood and R. E. Rettger). At Lytton Springs the oil has accumulated against the fault in the most porous rock available, i.e., the "serpentine." As the "serpentine" transgresses the fault plane the oil has done likewise.

the close association of some of the pools with igneous activity. It is interesting to note in this relationship that carbon dioxide, which is not usually associated with petroleum, is one of the characteristic gases in the Northern Mexican fields. Probably this gas has been produced by metamorphism of the limestones. Another good example of accumulation is an igneous rock due to its porosity is Lytton Springs in Texas.[25] This field lies in the general zone of the Balcones Fault. An igneous intrusion has occurred along its fault zone and the rocks on both sides of the fault have been injected. (Figure 9.) Normally in these fields only the southeastern side of the fault contains the oil accumulation, but at Lytton Springs the oil is on both sides and its position is clearly governed by the occurrence of the igneous rock.

Summary of Oil Accumulations

The examples cited above illustrate the complexity of the structures in which oil accumulations occur and how far short of the truth is the popular conception that the anticlinal theory is the sum and substance of the structure of oil pools. Also, when particular fields are studied it is often noted that not one but several influences have played a part in their formation; in fact, it is impossible to give a satisfactory classification of the structures of oil pools because in so doing the issue has to be so simplified that it tends to distort the truth, making the classification a hindrance rather than a help.

On the other hand it is important to note that in particular regions the oil accumulations tend to be due to certain dominant influences which may be quite different according to the general regional structure. It is therefore of help to the student to draw attention to these regional characteristics and with this in view the writer has adapted this method of classification. The important features of each area are summarized below.

A. Oil Fields in Regions of Horizontal Strata:

The dominant features causing local oil concentration are lithological rather than structural and the position of the coarse reservoir rocks determines the general location and many of the boundaries of the oil and gas pools. Water plays an important part in "containing" the gas and oil, and the relative water saturation of the rocks is highly important. Though these areas display very little structure, it is noteworthy that in the larger sand reservoirs the gas and oil distribution is highly sensitive to the minute differences in the

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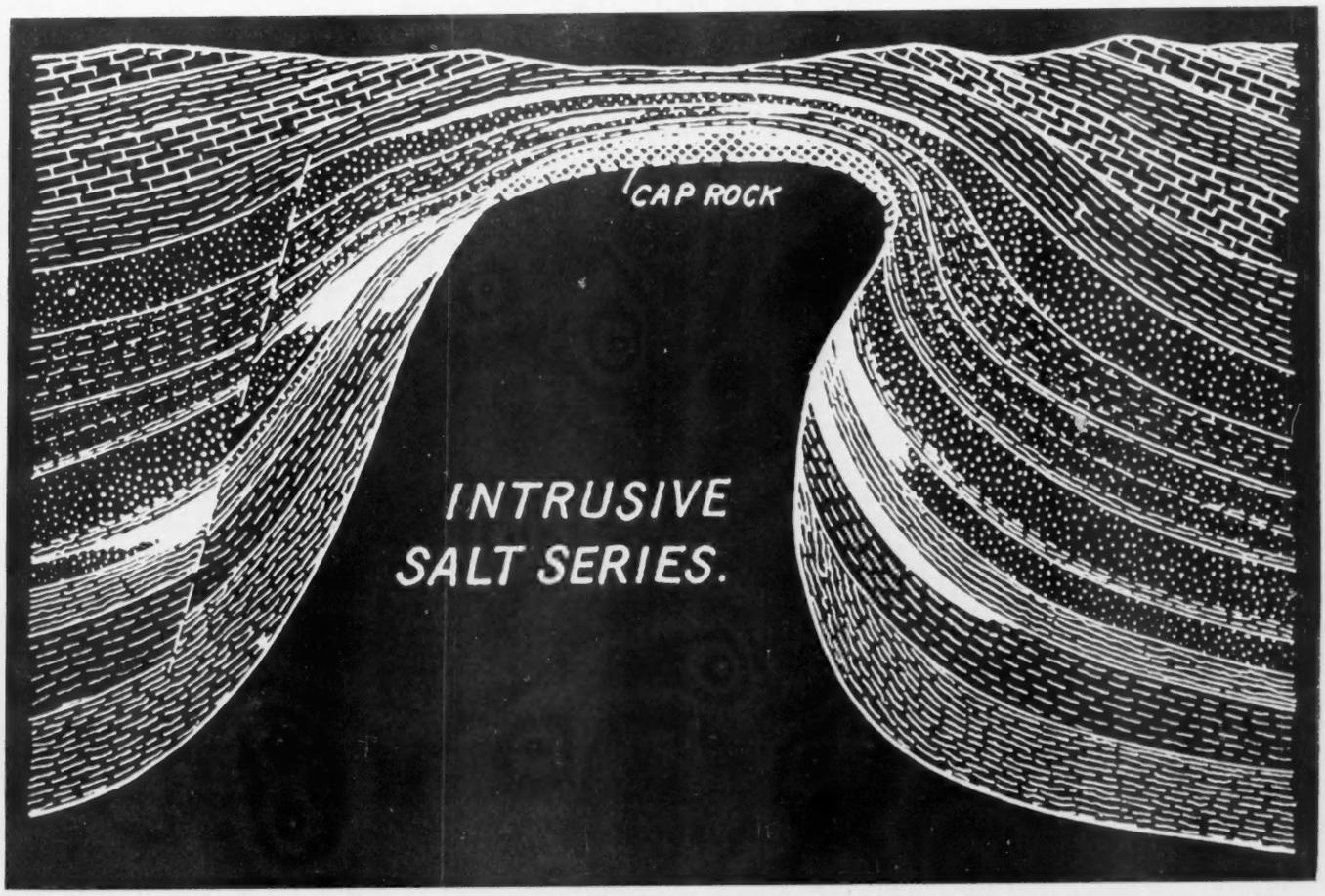
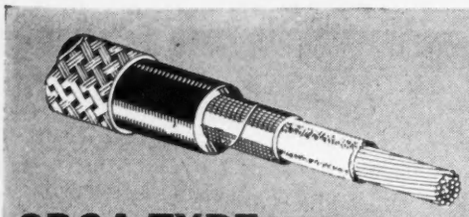
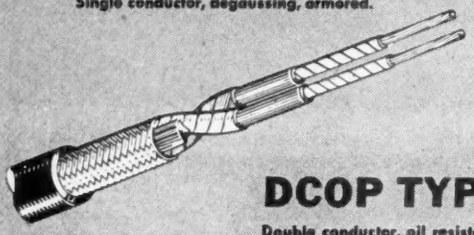


Figure 10. Diagrammatic cross-section through a salt dome. The three zones of oil accumulation associated with salt domes are illustrated. In addition the highly disturbed nature of the structure near the flanks of the salt intrusion leads to considerable faulting, and such faulting produces further local oil accumulation.



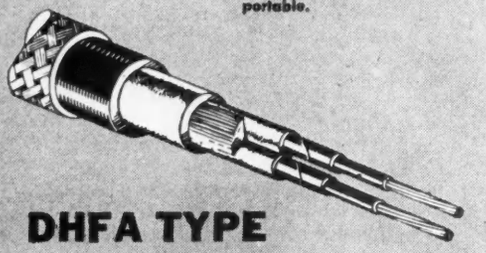
SDGA TYPE

Single conductor, degaussing, armored.



DCOP TYPE

Double conductor, oil resistant, portable.



DHFA TYPE

Double conductor, heat and flame resistant, armored.

MDGB TYPE

Multiple conductor, degaussing, binnacle.

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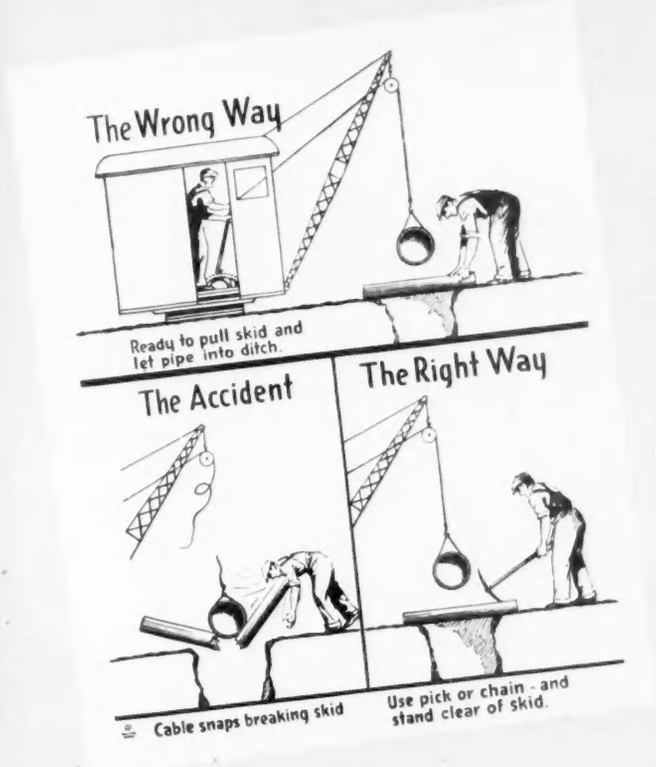
The Wrong Way
Ready to pull skid and let pipe into ditch.
The Accident
The Right Way
Cable snaps breaking skid
Use pick or chain - and stand clear of skid.

FUNDAMENTALS OF INDUSTRIAL

Accident Prevention

PART 5
Safety Inspections

By C. L. HIGHTOWER
Safety Director, United Gas Pipe Line Company and Union Producing Company

WHERE accident prevention is integrated with operating procedure, the operating personnel is charged with the primary responsibility for inspecting and properly maintaining tools, equipment, machinery, buildings and other physical properties.

This is logical, as the proper use and operation of such equipment and property requires almost constant care and attention, and only the workmen on the job and the supervisor in charge are in a position to make close and constant checks. By reason of familiarity with the tools and equipment and understanding of the stress and strains to which they are subjected, these men are in the best position to determine when wear or defects develop to the point that breakdowns or hazardous conditions are probable.

It is also true that failures which result in job shutdowns, and curtailed production arise from the same causes as failures which result in injury to employes and property damage, again emphasizing that safe operation and efficient operation are one and the same.

Check List

The inspection of moving machinery and power-driven tools such as is made by the operator or oiler in his periodic rounds or daily checks does not usually require a report form. Defects are repaired and replacements made as a routine part of operation and maintenance. In some manufacturing processes, inspectors are assigned to full time duty in checking certain equipment. However, it is usually considered advisable to have "spot" inspections made by someone other than the operator or process inspector at periodic intervals. Sometimes these checkups are made by inspection committees and occasionally they are made by the safety engineer. A "check list" or inspection form is helpful in making such inspections, as it is quite often the case that the person making the inspection is not familiar enough with the equipment or property to know just what conditions to look for. A "check list" or inspection form is also helpful to the experienced man, as it insures that no important point will be overlooked.

The "check list" or inspection form used will depend on the nature of operations and the variation in types of equipment and tools. Special forms and lists would be required for each industry and operating process.

In order to indicate the manner in which these forms may be developed a sample "check list" and a typical tool inspection report are included.

Reports on the results of safety inspections should be submited to the supervisor in charge, and where the inspection is being made by the safety engineer particularly, the report should be discussed in detail and the reasons for the recommendations submitted thoroughly explained.

The effectiveness of any inspection program is dependent upon the manner in which the reports are followed up and the suggestions and recommendations carried out.

Check List for Inspection of Compressor Station

A. Electrical Wiring

1. Open circuits.
2. Lights without proper guards.
3. Explosion-proof globes.
4. Conduit and wiring.
5. Proper type of material used.
6. Proper installation.
7. Extension cords and lights.

B. Engines

1. Flywheels, guarded and balanced properly.

2. Crankshaft guarded.
3. Other moving parts guarded.
4. Operation.
5. Vibration.
6. Foundation
7. Ignition.
8. Lubrication.
9. Pop valves on compressors.
10. Engine piping for leakage.
11. Safety switches on compressors.

C. Valves, Piping and Fittings

1. Proper working pressure or type.
2. Leakage.
3. Operation.
4. General appearance.

D. Pressure Gauges

1. Accuracy.
2. Leakage.

E. Floors

1. Wet or oily.
2. Cleanliness.
3. Piles of materials.
4. Fire hazards.
5. Oil rags.
6. General appearance and condition.

F. Stairways and Walkways

1. Condition of floors.
2. Risers.
3. Treads.
4. Hand rails.
5. General appearance and condition.

G. Pits

1. Guard rails and hand rails.
2. Steps.
3. Cleanliness.

H. Basement

1. Electrical wiring and equipment.
2. Stairways.
3. Basement piping.
4. Light.
5. Ventilation.
6. Exits.
7. Cleanliness.
8. General appearance and condition.

I. Tools

1. Handles.
2. Heads.
3. Jaws.
4. Stored properly.
5. General appearance and condition.

J. Safety Equipment

1. First aid kits.
2. Goggles.
3. Spark resisting tools.
4. Fire extinguishers.
5. Gas masks.
6. "No smoking" and other warning signs.

K. Building

1. Light.
2. Ventilation.
3. Exits.
4. Foundation.
5. General condition, interior and exterior.

INSPECTION REPORT ON TOOLS

District _____ Location _____ Date Inspected _____
Inspected by _____
DIGGING TOOLS:
1. How many shovels have broken handles _____ Loose handles _____
2. How many picks have broken handles _____ Loose handles _____
3. How many spades have broken handles _____ Loose handles _____
4. How many mattocks have broken handles _____
5. How many post hole diggers have broken handles _____
HAMMERS:
1. Are hammer heads bradded _____ Are handles broken _____
2. Are handles loose _____
AXES:
1. Are axes sharp _____ Are handles loose _____ Are handles broken _____
CHISELS:
Are chisels sharp _____ Do they have mushroomed heads _____
END WRENCHES:
1. Are jaws spread _____
PIPE WRENCHES:
1. Size _____ Make _____ What is the condition of handles _____
Jaws _____ Frame _____
SPECIAL TOOLS:
Remarks: _____

Petroleum Geology

■ CONTINUED FROM PAGE 29

level of the reservoir rock. Gas separates out above oil in higher portions of the structure; hence, though it cannot be said that structural features determine the position of the oil pools, they do in many cases modify the distribution of the gas, oil and water.

B. Oil Fields in Areas of Gently Inclined Rocks:

The marked difference between this and the preceding group lies in the polarity of migration. There is an almost universal tendency for oil and gas movement up-dip, and any feature which obstructs this movement may become an important reservoir. Structural terraces, monoclinal domes, buried ridges, zones of overlap and overstep, irregular sand lenses, etc., may all play their part. Thus, oil accumulations are largely the combined effect of structure and sedimentation, and the search for oil demands intense stratigraphic studies, and detailed mapping.

C. Oil Fields in Folded Strata:

These areas display the truth of the anticlinal or the dome theory of oil and gas accumulation, but such structures are rarely simple, and when examined in detail it is noted that other structural features as well as the distribution of rock types play an essential part in locating the gas and oil. In some cases where the reservoirs are limited in extent the scope of the anticlinal theory is practically destroyed and the local accumulations are dependent essentially on the distribution of the lenses of porous reservoir rock. In other cases faulting becomes far more important than folding in the trapping of the accumulation. The distribution of oil pools in folded rocks, although not limited to the lines of the Tertiary mountain building movements, are certainly prone to occur mainly within them. Hence, most of the anticlinal oil fields are of Upper Mesozoic and Tertiary age.

Regional Faulting

D. Oil Fields in Regions of Normal Faulting:

There are some areas where regional faulting plays a dominant role in oil accumulation. The faults are mainly normal and appear to have trapped oil migration moving updip. Such areas tend to adjoin basins of sedimentation and represent traps across the path of oil which is migrating shorewards.

E. Oil Fields in Salt Dome Regions:

Salt dome structures have already been regarded as highly favorable to oil and gas accumulation largely because they occur in areas of great thicknesses of sedimentary rocks and they present suitable structures for the oil and gas to concentrate. There may be, however, an additional influence in the possibility that such structures induce highly developed fracture zones across the strata. These must play an important part in transformational oil migration and it may therefore be partly due to this latter factor that the oil and gas become finally localized in the nieghborhood of the edge of the salt and over the salt crest. (Figure 10.)

F. Oil Fields of Unusual Types:

Finally, there are a considerable assortment of oil structures which do not show any relationship to any of the previous features. Among these the most impotrant general group are the oil pools associated with igneous rocks. These appear to be due mainly to the metamorphic and disturbing effects of igneous intrusions in the creation of suitable reservoir conditions. The better known of these examples tend to lie in regions where the strata are compact and require an additional influence to create adequate porosity.

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Professor Illing's paper is published by The Oil Weekly in accordance with arrangement and consent of members of the Council of The Geologists Association, London, England, for the purpose of acquainting Americans in the oil industry with the work of scientists abroad.

Cycling Operations

OPERATIONS BECOMING INCREASINGLY IMPORTANT; PRINCIPLES ARE OUTLINED

By H. H. KAVELER
Assistant to Vice President, Phillips Petroleum Co.

CYCLING operations are becoming increasingly important because of the frequency of occurrence of gas-condensate reservoirs in the deep strata now being explored. Such operations will become more important, also, as the industry, the public, and the regulatory bodies become better informed on the requirements for successful exploitation of condensate pools.

The ever-widening scope of gas-condensate cycling operations is indicated by a recent survey which showed that in 1945 there were 41 cycling plants in the U. S. The daily average production from these plants was 88,200 barrels, while there were some 250 pools in the country classified as gas-condensate reservoirs. Condensate has grown to be significant in volume of production, particularly in Louisiana and Texas, while deep drilling in other areas is adding to this type of reserves. Because of the increasing importance of this operational phase within the oil industry, it is well for the operator to familiarize himself with some of the elementary engineering and conservation principles upon which modern practices in gas-condensate cycling operations are based.

Changing Viewpoints

By actual experience or through reading, the operator knows that exploitation practices of petroleum reservoirs have undergone a significant change in recent years. By present standards, past practices in the production of petroleum were wasteful. In the "good old days" wells were drilled as closely as possible, opened as wide as possible, and produced as quickly as possible. In those days a producer's share of the oil in a pool was that quantity he could capture, save, and sell by whatever means competitive ingenuity would dictate. Little or no attention was paid to the nature of oil reserves, the quantity of petroleum initially-in-place in a pool, or the waste of otherwise recoverable oil that occurred when an individual operated in a manner as to get his "share." The mechanics of well drilling and the maintenance of well-potential were the producer's principal concern. The industry labored under fears of an uncertain economy created by widely fluctuating price for crude oil. In the "good old days" petroleum production was more a game, more a wildcatter's venture, than a business enterprise.

In such time past, natural gas was considered an evil. Its presence in a pool was often regarded as a misfortune. It had little or no commercial value and, insofar as the oil producer was concerned, was regarded as something to be dissipated as quickly as possible in order that oil might be recovered from a pool.

By today's standards the general practices as late as those of 20 years ago were wasteful. Today, the development and operation of petroleum reservoirs is directed more to conservation in the sense that the greater effort is directed to obtaining maximum ultimate recovery. Conservation is accomplished by application of technical knowledge concerning the characteristics of reservoir rock, the nature and behavior of the fluid content of the rock, and a clearer understanding of the function of wells in recovery operations. Wells alone and well-potentials are no longer of prime importance. Now the industry is more concerned with the rate of production from pools than with the rate of production from individual wells. Modern practices are directed more to the principle that wells should be drilled in a manner so as to efficiently produce pools rather than be drilled as a means of permitting an individual to gain a competitive advantage. The "right to drill" a well and produce some of the pool's reserve from it without regard to any other factor results in practices in conflict with conservation, good business management, and the correlative rights of others. Present-day practices, based upon the principle of conservation, lead to a more stable industry, greater return to royalty owners, operators and the state. It is also true that conservation practices have made petroleum available to the ultimate consumer at lower and lower prices.

A Basic Principle

This significant change in production practices over the past 20 years is influenced largely by the basic and fundamental fact that petroleum does not produce itself from sub-surface reservoirs but rather is produced through the agency of both natural gas or encroaching water. Liquid petroleum is recovered from wells because it is expelled from reservoirs into well bores by natural gas or encroaching water under pressure. This knowledge leads to an important conclusion, i.e., production can be obtained from a pool only so long as some pressure of natural gas or encroaching water exists. It follows that the level of the reservoir pressure in any pool is the measure of future productive life and the determining factor in fixing the reserve remaining in the pool. It follows also that pressure maintenance leads to the greatest ultimate recovery. Engineering computations show that pressure maintenance beginning from the time of first production leads to a significantly greater ultimate recovery than can be obtained by repressuring after primary pressure is depleted. That conclusion is established from experience in actual practice. This basic principle finds expression in other statements upon which modern production practices are based.

Controlling Factor

The controlling factor in obtaining the highest recovering from a reservoir is not the rate of production from individual wells, but is the rate of production from the common source of supply as a whole. The injection and return of produced gas has the effect of maintaining pressure by reducing the net volumetric withdrawal per unit of production obtained. The production of high gas-oil ratio wells is wasteful because such wells unnecessarily destroy the productive energy source. Gas-condensate wells are usually "high" gas-liquid ratio wells. Production of such condensate wells without pressure maintenance often leads to the loss of several hundred dollars of available and saleable petroleum in order to recover only a fraction of $100 worth of production. This is waste in the real sense.

Conservation and sound practice is leading the industry to realize that the method of operation of a pool is more important in fixing the ultimate recovery than is any question related to number of wells drilled, well spacing, or well-potential, considerations which loomed largely in the earlier days of the industry.

General reference to these principles is designed to call attention to the fact that cycling operations are based entirely on these principles. Cycling is an operation that embodies the most modern concepts of conservation. It in-

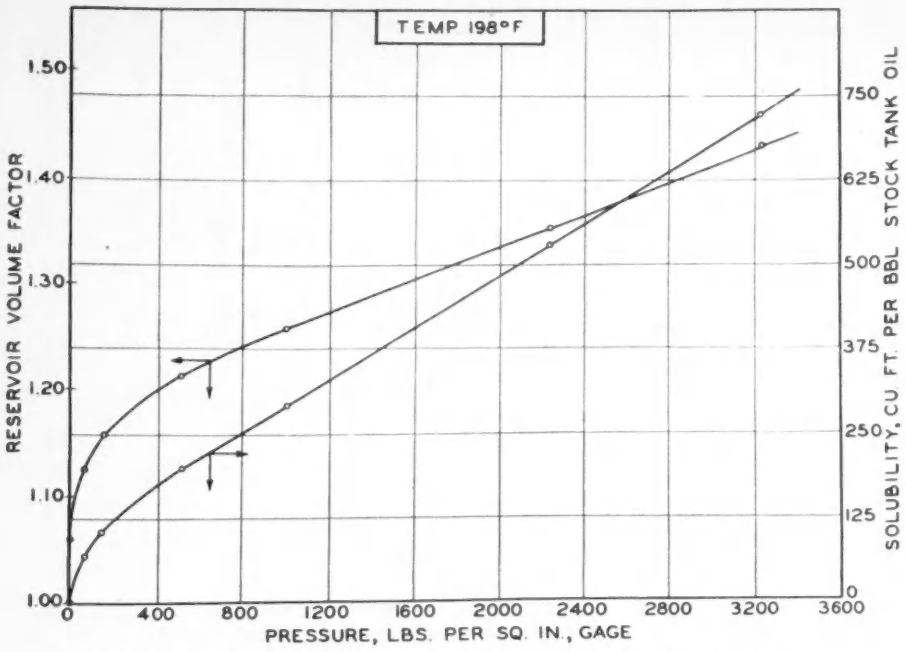


Figure 1. Solubility and shrinkage curves—Typical Mid-Continent crude.

volves: (1) fitting the recovery operation with due regard to the nature and character of the petroleum-in-place; (2) pressure maintenance at the highest practical level; (3) adapting well-spacing to the requirements of recovery operations; (4) adjusting rate of production to the requirements of efficient operation; (5) unitization and cooperative enterprise.

What then is the nature and the character of the petroleum-in-place in gas-condensate reservoirs that requires exploitation practices under principles stated if the royalty owner, the operator, the state are to derive maximum benefit from a condensate reservoir?

Distillation of Crude by Heat

We know that crude oil is composed of a mixture of substances called hydrocarbons and that it is a colored material usually black or green, having an API gravity of 50° or less. We are familiar with the fact that crude oil can be separated into various commercial products such as motor fuel, kerosine, fuel oil, paraffin wax, asphalt, and tar, by a process of distillation. Crude oil subjected to heat at atmospheric pressure will boil at temperatures as low as 80° F., and, by heat, it can be partially vaporized . . . partially converted into gas. If the vapors formed by heating are conducted from the still and cooled, a distillate is recovered. By conducting such a distillation in a step-wise manner at successively higher boiling temperatures, crude oil can be separated into the various commercial products just mentioned. The gasoline fractions are more readily vaporized and are the first to boil off and be recovered by distillation. The lubricating oils, waxes and heavier substances are less volatile. They have the higher boiling point and are recovered in the last phases of the distillation operation.

Furthermore, we know that natural gas is associated with crude and that gas separated from crude oil carried with it some lighter, more volatile fractions of the oil. Such gas, by processing in natural gasoline plants, yields a product called casinghead gasoline. In such plants, normally gaseous materials, propane and butane, are also recovered and marketed as "liquefied petroleum gas".

Liquid and Gas

To those outside the industry knowledge of crude and natural gas is based upon the relatively simple conceptions obtained from viewing petroleum in the form in which it is recovered and used on the surface of the earth. Conceptions of natural gas and crude are therefore those obtained by examining these materials at temperatures and pressures prevailing on the surface of the earth. Ordinary conceptions are also based upon experience in the use of refined products obtained from natural gasoline plants, refineries, and gas pipe lines.

In Table 1 there is shown in columns 1 and 2 a general chemical classification of the constituents of an average Mid-Continent crude and its associated natural gas (solution gas). The normal boiling points of the various substances are given in Column 3. In Column 4, the average content in various commercial products is given for the average crude.

If there be any mystery about gas-condensate production it springs entirely from a direct transfer to sub-surface reservoir conditions of the notions one may have about natural gas and crude oil from viewing natural gas and crude oil and their derivatives under the relatively low pressure and temperature contions existing on the surface of the earth.

"One and the Same Thing"

It is well to note that the words "liquid" and "gas" are of purely relative meaning and used as a convenience and necessity in distinguishing between liquid and gas as representing physical states of matter, but we must not oversimplify the terms if we are to understand the behavior of petroleum liquids and gases under the temperature and pressure conditions existing in deep reservoirs. When natural gas is subjected to high pressure and temperature and when crude is subjected to the same conditions, it often is impossible to distinguish one from the other as being gas or liquid. This is particularly true if crude and natural gas are coexisting under conditions of pressure and temperature found in deep reservoirs. What on the surface of the earth are liquid and gas, may in the sub-surface be, and behave, like one and the same thing. Petroleum resources cannot be intelligently developed until this important engineering fact is more generally understood. There is often no clear distinction under reservoir conditions between what may be called in one instance a "gas pool" and what may be called in another an "oil pool." Many pools producing crude have characteristics closely approximating those which are to be found in gas pools. Because of this it is often difficult to convince owners of interest in a pool producing colored oil or a very rich condensate at a low producing gas-condensate ratio, that such a pool should be operated more in the manner that gas fields have been operated than in the manner of operation for the conventional oil pool.

Crude has a capacity for dissolving natural gas. If crude and natural gas are placed in a common container and subjected to increasing pressure by the continuous addition of natural gas, the oil will dissolve gas to an extent determined by the existing pressure and temperature. Such solution occurs in oil reservoirs. The fact is recognized by the measurement of the more or less familiar solubility-shrinkage curves. As a result of the solution of natural gas due to pressure in sub-surface reservoirs, the volume of the reservoir oil is greater than its stock tank equivalent due to the volume of the gas dissolved. A typical solubility-shrinkage curve is shown in Fig. 1. In this instance a barrel of pipe line crude at 3200 pounds per square inch of pressure at a reservoir temperature of 198° F. holds 708 standard cubic feet of gas in solution and, as a result, the one barrel of stock tank oil actually represents 1.43 barrels existing as liquid in the sub-surface reservoir.

Whenever there happens to be more natural gas present in a pool than the oil present is capable of dissolving at prevailing conditions of pressure and temperature, excess natural gas remains as a gas-cap over the oil. This frequently occurs. Often the excess of gas is so great as to cause most of the pool to be occupied by such free and undissolved gas. The extreme case is the existence of a gas field where crude is absent altogether.

Vaporization by Pressure

Attention has been called to the distillation of crude oil by the application of heat and to the capacity of crude to hold natural gas in solution. In order to take one step further toward an understanding of the nature of gas-condensate, it is well to point out that when natural gas is in the presence of crude under the influence of pressure the changes occurring as a result of increased pressure involve more than just the solution of gas in crude. As pressure is increased, the tendency is for the crude always to dissolve more and more gas. But, when pressure exceeds 800 pounds per square inch, generally speaking, even though gas continues to go into solution with increasing pressure,

the effect of pressure is to cause vaporization of the crude into the gas. Such vaporization or distillation as a result of pressure is comparable in many respects to vaporization or distillation brought about by the application of heat. Just as in distillation by heat, the lighter fractions show the greatest tendency to vaporize into gas. Vaporization into the gas continues with increase of pressure in excess of 800 pounds as long as any free gas remains in contact with the oil. The capacity that natural gas has for holding lighter fractions of crude as a result of the application of pressure is the secret behind the essential characteristics of the gas-condensate material. We can understand how by the application of heat the lighter fractions usually found in crude can be caused to boil and pass into the vapor state. The attention of many in the industry has, however, not been forcefully called to the fact that a similar transformation can be brought about by the application of pressure to crude in the presence of free gas (e.g., a gas phase).

Two Influences

Natural gas, therefore, has a capacity to carry lighter fractions found in crude as a result of two influences existing in sub-surface reservoirs. One is the influence of temperature causing distillation and the other is the influence of pressure above 800 pounds per square inch (generally) which produces a similar effect.

The amount of "normally liquid" oil that can be carried by gas varies with the basic composition of the oil and gas involved but may become very appreciable at temperatures in the range of 175° F. to 250° F. and pressures of 5000 to 10,000 pounds per square inch encountered in the deep pools now being developed, particularly in the Coastal Area.

When natural gas enriched in light hydrocarbon fractions through the influence of both temperature and pressure is produced to the surface of the earth, the resultant reduction in temperature and pressure reverses the distillation process that occurred in the reservoir. Condensation occurs. Condensate is formed. The condensate so recovered can be generally described as water white, higher than 50° gravity, and as a material having the general appearance of the motor fuel-kerosine fraction distillated from crude. Condensates may, and generally do, contain petroleum fractions heavier than kerosine that may be as heavy as lubricating oil and paraffin wax.

In Table 1, Column 4, the content of a barrel of typical Gulf Coast condensate is classified in respect to the usual commercial fractions it contains. It may be observed that 32,150 cubic feet of natural gas is capable of producing one barrel of condensate having as much gasoline as a barrel of typical crude oil and containing, in addition, appreciable quantities of gas-oil, lubricating oil, and even more than traces of fuel oil and paraffin wax. Hydrocarbon material as heavy as paraffin wax is usually expected to be found in crude only. Natural gas as it exists in the sub-surface reservoir may contain, even though in small amounts or only in traces, nearly all of the constituents normally found in crude.

Generally speaking, gases from deep reservoirs are condensate bearing. Some are quite rich while some are lean. The difference in content arises from conditions associated with the origin of petroleum, its migration, and conditions of accumulation and storage in the subsurface. Gas produced along with crude from deep reservoirs are condensate bearing, but, by production along with crude, the condensate is recovered with the crude and sold as such.

Why does pressure exerted through a natural gas phase cause crude to vaporize? There is no real answer to this question and all that can be said with certainty is that crude and natural gas simply behave that way. That they do behave that way is a well-established fact.

Condensate reservoirs are for the most part reservoirs that contain natural gas almost exclusively. Little crude is usually found in the important gas-condensate pools. Our main interest is therefore in the characteristics of the rich gas in the absence of crude. How the gas in gas-condensate pools became enriched is not an important question. The enrichment may have occurred as a consequence of the process involved in the origin of the gas or the enrichment may have occurred in the course of contact of the natural gas with crude during the process of migration or accumulation.

Retrograde Behavior

When gas-condensate gas is subjected to variations of pressure in the absence of a crude phase, the pressure effect causing vaporization and condensation of the normally liquid fractions contained in the gas is more pronounced. From low pressures up to about 800 pounds per square inch the effect of pressure increase on a gas-condensate system is to cause condensation from gas. The vaporization effect of increasing pressure does not occur until pressure is increased beyond this average level. Speaking conversely, condensation will occur from gas as reservoir pressure decreases from a high value down to about 800 pounds per square inch and below that level the tendency will be toward vaporization. The change that occurs with change in pressure in any given direction either up or down is therefore not continuous. There is a pressure point at which maximum condensation occurs. At pressure above or below this point the amount of condensation is less. Because of such a reversal the process is spoken of as being "retrograde" in nature. The word being simply that a reversal occurs at some point.

Figure 2 is presented to show in a generalized way the retrograde behavior of a typical gas-condensate. It shows the influence of pressure at constant temperature upon the amount of condensate formed and the very significant influence of temperature. The amount of condensation is greater at the lower temperature existing at the surface of the earth and, generally speaking, the effect of decreasing temperature is greater than the effect of changing pressure at a fixed temperature. At any temperature there is a pressure of maximum condensation. This is the so-called "retrograde pressure" point. Procedures are developed whereby curves of the type shown in Figure 2 can be accurately reproduced by any gas-condensate. Such engineering information is necessary and essential to the design of conservation production practices in the exploration of gas-condensate pools.

Figure 2 shows clearly the necessity for maintaining reservoir pressure in gas-condensate pools for the purpose of preventing condensation in reservoirs as a consequence of pressure depletion through production. As much as from 20 to 60 percent of otherwise recoverable condensate may be lost to recovery by condensation in the reservoir rock if a condensate pool is produced without pressure maintenance.

Condensate formed within the reservoir rock is unrecoverable. It wets the sand grains and is trapped within the

TABLE 1

HYDROCARBON	Boiling Point	VOLUME PER BARREL STOCK TANK LIQUID		
		Typical Crude		Typical Condensate
$C H_4$ (Methane)	—259°	899 cu. ft.	973 cu. ft.	32,150 cu. ft. Gas
$C_2 H_6$ (Ethane)	—127°	74 cu. ft.	Residue Gas	
$C_3 H_8$ (Propane)	— 44°	1.75 Gal.		
$C_4 H_{10}$ (Butanes)	+ 31°	1.13 Gal. Natural Gasoline	12.73 Gallons Motor Fuel	24.53 Gallons
$C_5 H_{12}$ (Pentanes)	97°			
C_6 (Hexanes)	156°			
C_7 (Heptanes)	208°			
C_8 (Octanes)	259°			
C_9 (Nonanes)	304°			
C_{10} (Decanes)	345°			
C_{11} (Undecanes)	385°			
C_{12} (Dodecanes)	421°		13.02 Gallons Kerosene	6.97 Gallons
C_{13} (Tridecanes)	459°			
C_{14} (Tetradecanes)	489°			
C_{15} (Pentadecanes)	523°			
C_{16} (Hexadecanes)	549°		5.00 Gallons Gas-Oil	6.68 Gallons
C_{17} (Heptadecanes)	583°			
C_{18} (Octadecanes)	604°			
C_{19} (Nonadecanes)	637°			
C_{20} (Eicosanes)	655°		6.55 Gallons Lube Oils	3.19 Gallons
C_{21} (Heneicosanes)	670°			
C_{22} (Docosanes)	710°			
C_{23} (Tricosanes)	735°			
C_{24} (Tetracosanes)	755°			
C_{25} (Pentacosanes)	775°			
C_{26} (Hexacosanes)	795°			
C_{27} (Heptacosanes)	815°			
$C_N H_{2N+2}$			3.90 Gallons Fuel Oil, Tar, Asphalt, Residue	0.63 Gallons

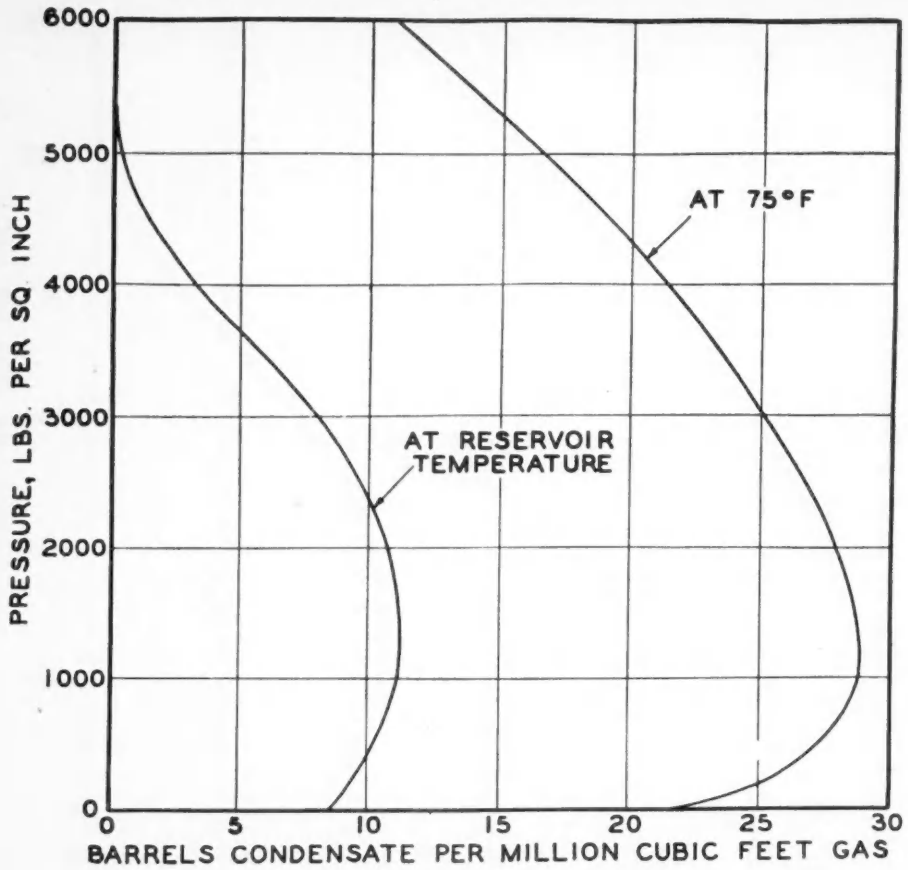


Figure 2. Typical retrograde condensation curves of a condensate reservoir gas.

porous space in such a manner as to be unrecoverable by any economic operation presently available or possible. That such condensation within the reservoir occurs is a face readily established by the constantly increasing gas-condensate ratio of wells produced from condensate pools in the absence of pressure maintenance operations. Gas-condensate wells may initially have ratios as low as 10,000 cubic feet of gas per barrel of condensate. These ratios may rise almost immediately that production is obtained and soon be in excess of 100,000 to 1. This simply means that substantial quantities of valuable petroleum reserves are being lost to recovery.

Conclusions:

The facts dictate clearly that pressure maintenance operation is necessary whereby the volume of gas taken from the pool is balanced by the injection of an equivalent volume of either gas or water, or both, or balanced by the equivalent volume of water encroachment under natural water drive.

The necessity for pressure maintenance operation further dictates that the operation should be carried on under unit management. This is the direction in which the industry is moving. There are generally two main problems involved in unit management. One is that of convincing all the owners interested in such a pool that unitization is essential and will result in maximum benefit; the second is the problem of accomplishing a fair distribution of equities in the unit operation.

The basis for equity distribution varies widely as between pools and as between areas. If the methods of equity distribution upon which unit operations are based were examined, a wide variety of methods will be found to be employed. The principle generally adhered to is to distribute equities in substantial proportion to the recoverable petroleum-in-place beneath each separate tract. Sometimes this may be accomplished by basing equity distribution upon the acre-feet of net productive formation. At other times, particularly where more than one pool is involved, it is necessary to base the equity upon the recoverable hydrocarbon-in-place beneath each respective tract. A convenient means where more than one pool is involved in a field is to compute the amount of condensate and the amount of residue gas-in-place beneath each tract and assign for purpose of equity calculation only, a dollar value to the condensate and to the residue gas and base the distribution upon the equity dollar value attributable to each tract.

Unitization and Cycling

If unitization is possible and is accomplished, cycling operations can be carried on very successfully. Many pools that would otherwise return a small profit to owners in interest, including royalty owners, can be operated with substantial success. Under unit management the development and operation of the field can be directed and adjusted to the economic requirements dictated by the particular conditions existing.

There are, of course, limitations upon the cycling operation. Often the gas-condensate is not rich enough. At other times pools are too small to justify the plant investment. In some instances the gas-condensate character of a pool is not recognized soon enough, with the result that an excessive number of wells are drilled to the point where capital invested in unnecessary wells precludes any type of operation but natural depletion in the hope that an unwise investment might be recovered. It follows from this that operators must be alert to recognize as soon as possible the gas-condensate character of any pool and to take steps immediately to bring about the pool's further development in a manner to make cycling economically feasible.

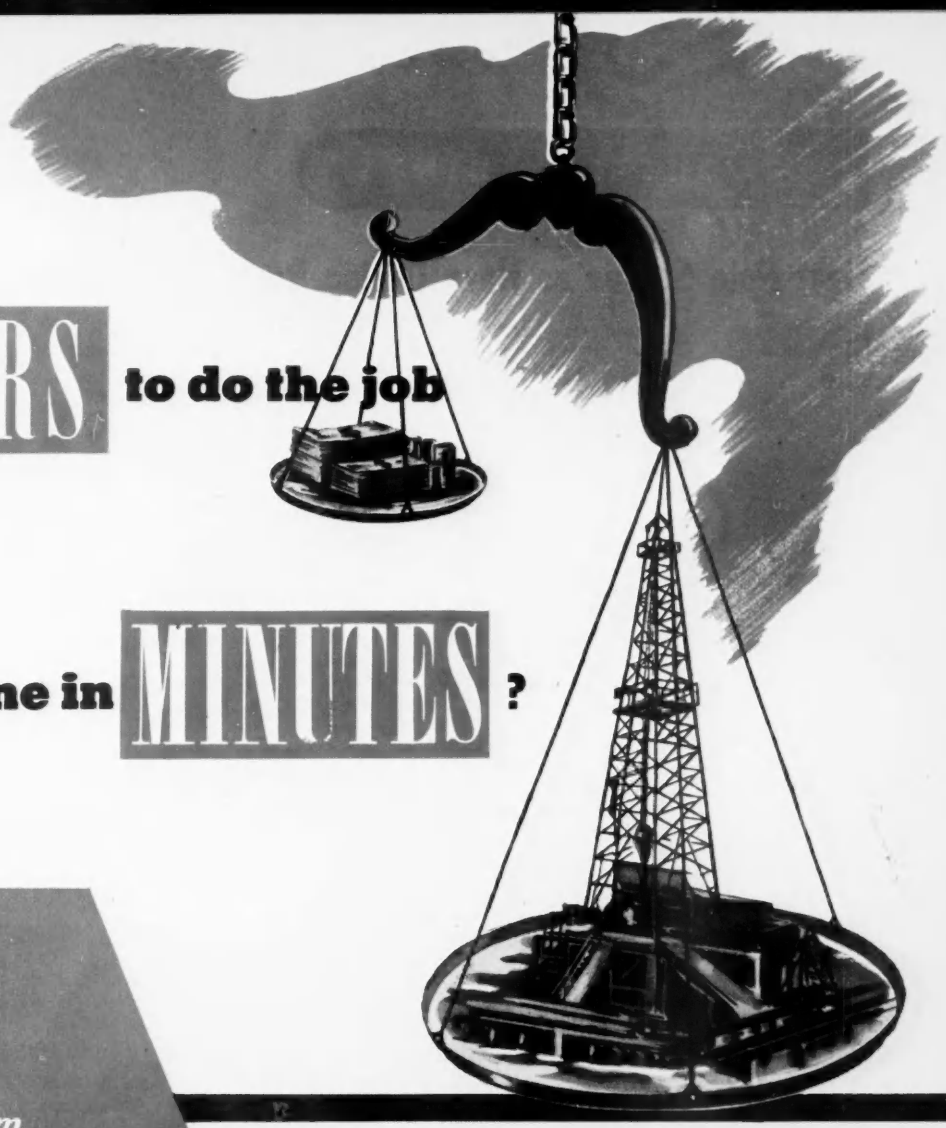
The best geologic condition over and above sand thickness and porosity which determines the reserves-in-place is uniformity of the sand body. Absence of shale breaks and the uniform distribution of permeability make toward a highly successful operation. On the average, it is possible to economically obtain by cycling a recovery of 60 to 80 percent of the condensate-in-place.

Well-spacing and well-location are not difficult problems in unit operation. In cycling, only such numbers of producing or injection wells are required as are needed to produce the chosen volume of production within economic limits of plant operating pressures. In the deeper pools, say below 7000 feet, the plants usually operate at from 1500 to 2000 pounds per square inch and the injection gas is injected at from 3000 to 4800 pounds per square inch. Present practical upper limit of operating pressure for injection systems is 4800 pounds per square inch. If deep pools are found that require a higher injection pressure, present practice requires that they must be produced by pressure depletion until they fall to within the operating pressure range.

In respect to locating injection and producing wells, the universal rule as dictated by behavior of reservoir fluids is to locate the injection and producing wells as far apart as possible. Reservoirs that have a long narrow configuration permit maximum displacement of injection wells from producing wells and therefore offer the most favorable conditions for cycling. Domal-shaped pools usually require one set of wells on the structurally high locations and the other set about the flank of the dome. The usual practice is to place the producing wells at the top of the structure and the injection wells on the flank. Several projects are operating very successfully with the injection wells in the water table just beyond the original gas-water contact. Almost any reservoir is suitable for cycling operations for the purpose of recovering gas-condensate. A solution to the technical problems involved is not difficult.

Contribute to Reserves

Gas-condensate pools can contribute substantially to the petroleum reserves of the nation and can be exploited in such a manner as to return a greater profit to the royalty owners, operators and the state, provided the basic fundamental facts here outlined are recognized and adopted as the basis for exploiting gas-condensate reservoirs. The technology is well established. Competent engineers can indicate to the industry how such pools should be operated. The industry faces the task of public education in respect to gas-condensate production and to bring about a better understanding of the practiecs necessary to conserve gas-condensate reservoirs.



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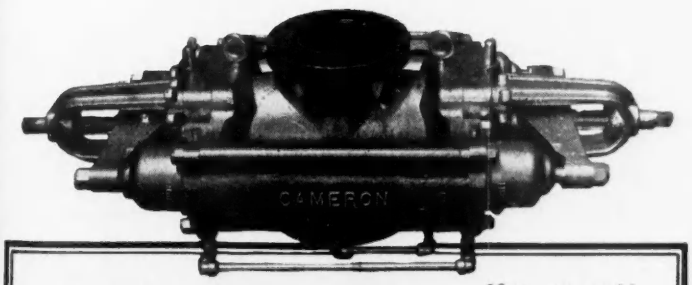

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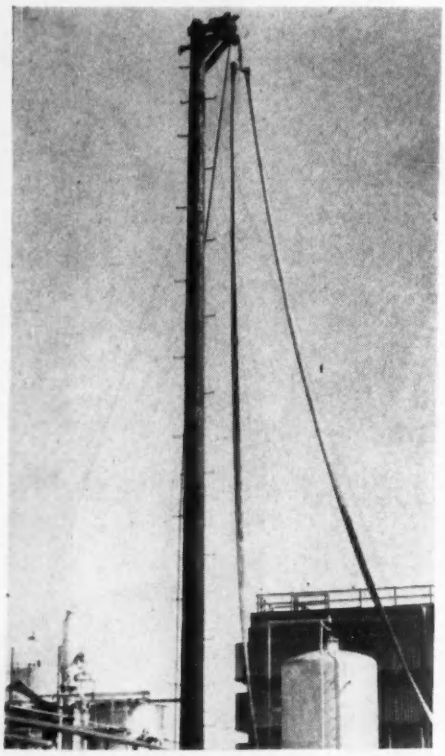

EQUIPMENT CARE

It is common practice to remove all moisture from inside fire hoses after use. An effective means for draining each hose section makes use of a floodlight tower or post on which a call horn is mounted. A suggested installation is shown with two sections of fire hose in suspension. Use was made of an abandoned light pole, to the top of which was constructed a short, well-supported arm that extended from the pole a short distance. At the end of this arm was mounted a small pulley of sufficient size to handle the expected load. A sling or "single tree" was constructed of strap steel which would safely support two sections of hose without crimping the hose body. The hose couplings fit snugly into the sling, attached to a small line threaded through the pulley at the top of the pole. This pole was equipped with ladder footings, the lowest of which served as a tie-down when the hose was raised to the top of the pole.

With this simple equipment it is an easy task for the fire department or production crew to efficiently dry fire hose before rolling it up for storage to be used again when needed.

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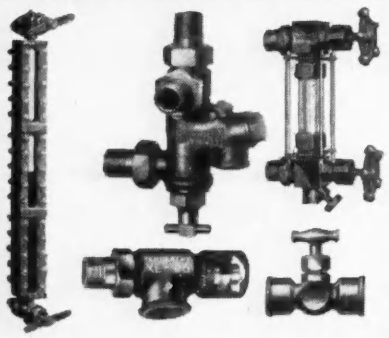

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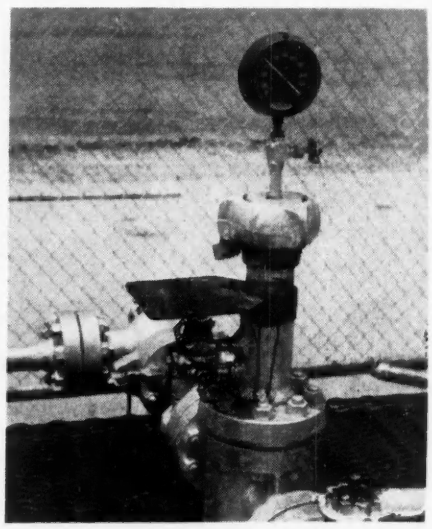
Pipe Fence Protects Well Head Equipment

LEASE PROTECTION

The problem of adequately protecting Christmas tree equipment on wells located in river bottoms and frequently flooded areas was solved by one producing company that designed and fabricated the enclosure shown. The tri-cornered fence was made from 2½-inch tubing welded at 18-inch intervals to the three upright corner legs. Each leg was embedded in concrete footings to secure them in place. In addition, a longer section of the tubing was welded at a 45-degree angle to form a brace which helps maintain the fencing in place during high waters. The well head fittings have been elevated above the ground to enable the lease man to make adjustments or change chokes during high water periods. The tubular fencing protects the Christmas tree from floating logs or debris which might be carried down the lowland with terrific force by the heavy currents. The triangular form is pointed upstream to deflect as much as possible any floating objects carried by the high waters.

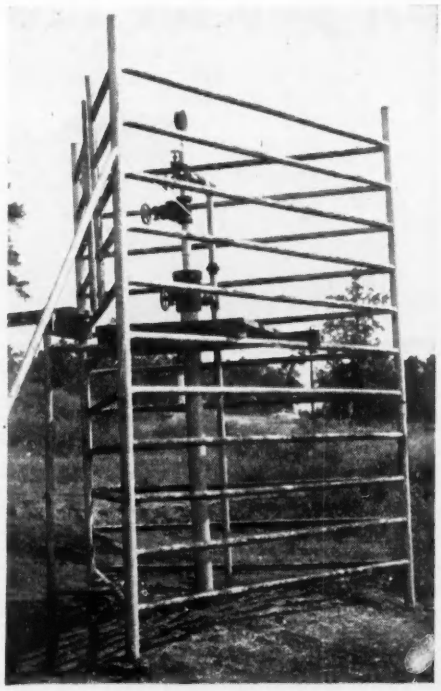
This particular structure has resulted in trouble-free operation of the leases located in these lowlands and river beds, while at the same time, permitting the pumper to carry on his work without interference.

Christmas Tree Step



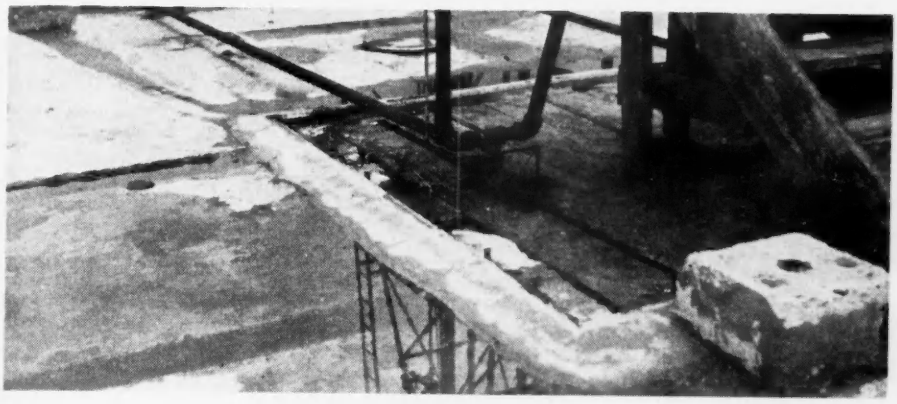
WELL HEAD EQUIPMENT

Equipping a Christmas tree with a mast preparatory to running a pressure bomb in the tubing usually involves the dangerous practice of climbing upon fittings in order to properly rig the equipment. To prevent accidental breaking or injuring of the small fittings, as well as to provide a convenient shelf upon which the operator can step, excellent results may be obtained by welding a small rectangular section of steel plate to a pipe collar and slipping the latter over the top of the tubing head as shown in the photograph. Installed in this manner, the step occupies little space on the tree, and helps to shield some of the smaller pressure recorder fittings near the top of the tubing. The small step is easily made up in the shop



PRODUCTION HINTS

Retaining Wall Reduces Cellar Flooding



LEASE CARE

A troublesome and time-consuming job that must be taken care of at frequent intervals during rainy seasons on wells located in builtup or cultivated areas is that of pumping out flooded cellars. If not pumped out, oil and oil-contaminated water may overflow and cause damage to surrounding areas. Developing an inexpensive method of reducing the runoff of rainwater into their cellars, one company built a small retaining wall around the well head. A "square" of two-inch pipe was fabricated and laid around the edge of the cellar, and concrete then poured beneath and along the outer edge of it, forming a low ramp and seals which prevents anything but a flood of water from entering the cellar. In addition, shallow sloping drains were cut in the concrete flooring at several points, enabling water to run off to the edge of the mat.

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Hold-Downs Improve Lease Pumping

JACK POWER LINKAGE

Proper cable hold-downs distributed along the length of a pull line running between the central power plant and the well jacks can easily spell the difference between an efficient and a poorly operated lease. This is particularly true in hilly regions where the pull lines have to traverse steep hillsides and where it is impossible to allow much slack in the lines without seriously affecting the lease production due to shorter effective strokes at the well.

Quickly built and easily adapted to any type of terrain, the device is constructed entirely from used or salvaged materials. The upright section is a length of two-inch pipe, to the bottom of which is welded a tee of similar size pipe. This tee is slipped over another short length of 1½-inch pipe to serve as a bearing over which the hold-down moves in following the movement of the jack line. This bearing section may be anchored to a small block of concrete or to two short sections of pipe driven into the ground.

To the top of the upright section of pipe is welded a two-link piece of rotary chain and to the upper half of this link is welded one section of a pair of curved pieces of iron between which the cable is clamped. To protect the cable from injury and wear at that point, it is cushioned by two small pieces of old belting or tire rubber.

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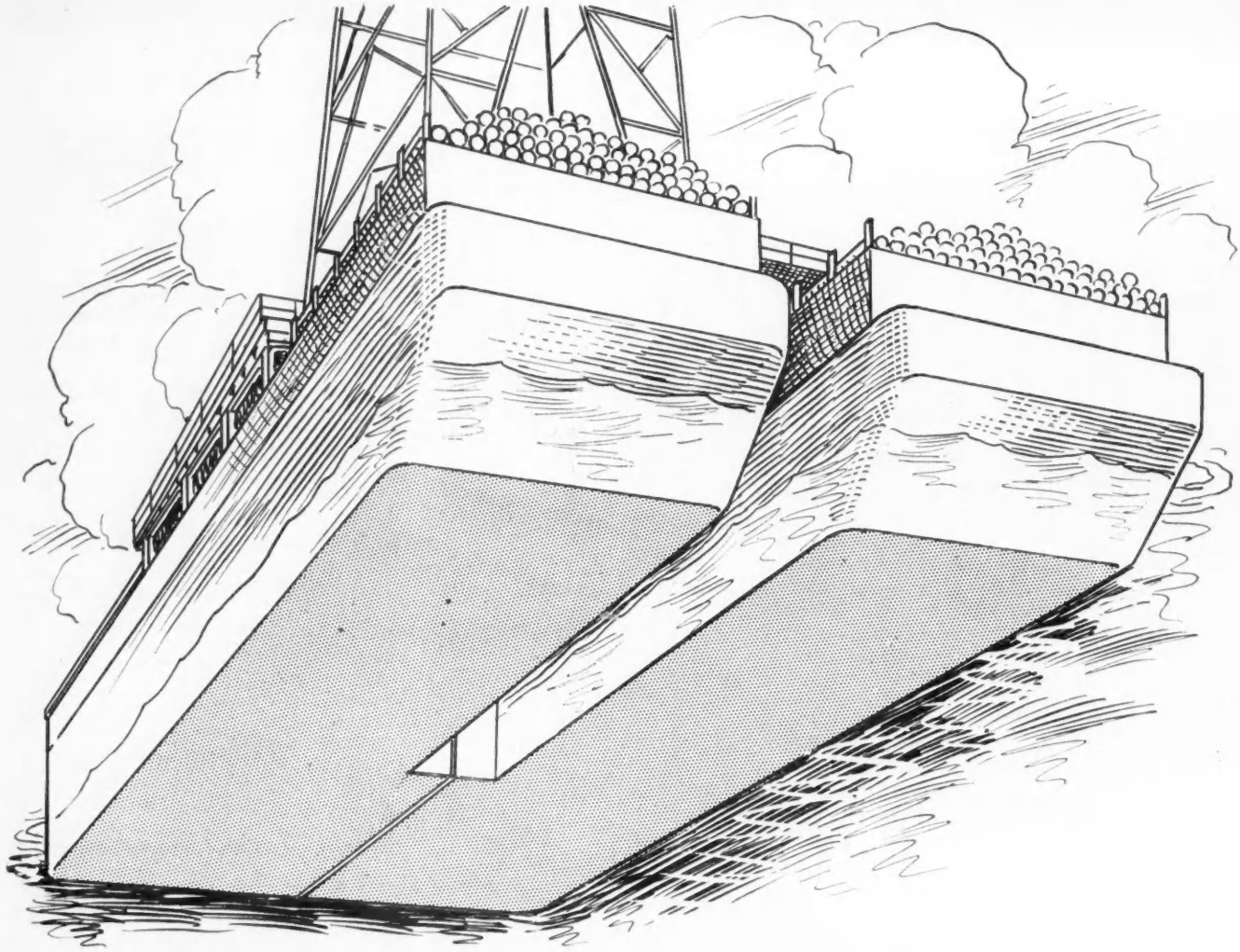


U-Shaped Drilling Barge

A TWIN-HULL drilling barge designed to furnish extra floor space as well as additional bouyancy on the heavy equipment end is being used successfully by The California Company in its new Bayou de la Fleur field of Jefferson and Plaquemines Parishes, coastal Louisiana.

Because of its unusual "U" shape, the barge has received the obvious designation of "horseshoe" barge. Other features include provisions to facilitate handling mud and removing sand from the drilling fluid, with several manifolds being installed to provide flexibility in directing fluids and pump pressures where they are needed, and facilities for controlling mud flow through optional channels in order to permit cleaning of individual elements in the circulatory system without shutdown or loss of efficiency.

Departing from the conventional design of drilling barges by the addition of protrusions in the aft halves of the two hulls, when the two sections are brought together, offsets or blisters coincide so as to come into contact, being separated only by a small building tolerance, and for practical purposes, provide a single hull. By eliminating the usual eight-foot gap between the two barges on one end, additional bouyancy is obtained on the aft section where the heavy equipment is located, and solid steel flooring is furnished for placing pumps and other equipment on space which is ordinarily wasted.

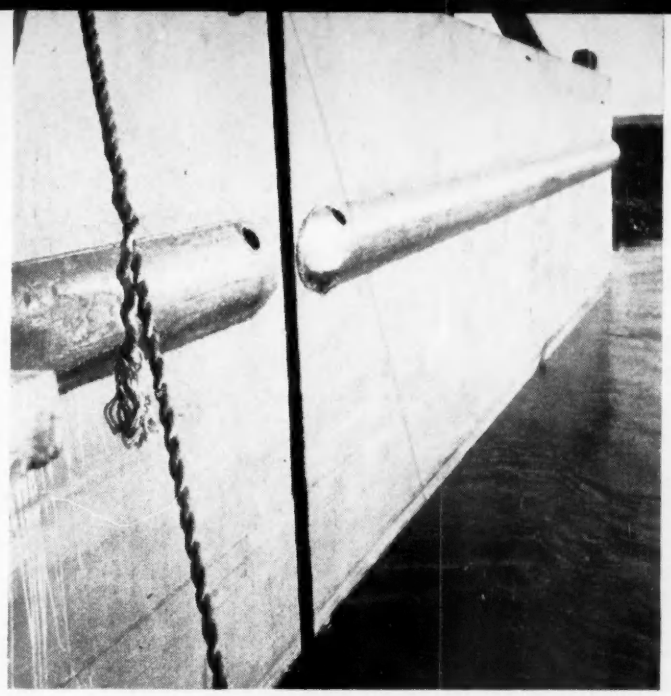
The forward end of the drilling barge is comprised of twin hulls, each 24 feet in beam, separated by an eight-foot slot or key-way. This section of hull, adopting the conventional pattern of barge design, contains two tanks for reserve mud supply, with the deck immediately above the reserve tanks being used for pipe racks.

The barge has an overall length of 140 feet and height of the hull is 12 feet. Each component hull is 24 feet in beam at its forward end, this width extending aft 78 feet, where by means of an offset and a 90-degree angle, width is increased to 27 feet 10 inches, remaining constant for the balance of the 62 feet to the stern. The blisters on the port and the starboard hulls are on the inside bulkheads of the respective hulls, and are contingent when the two sections are brought together, excepting for a separation of three or four inches which is packed. The two hulls when positioned properly have an overall width of 56 feet.

Trusses Join Hulls

The hulls are joined together by heavy trusses made of I-beams with vertical pins which are removed from either side of the trusses to separate the hulls and facilitate moving the barge to other locations. The pins which fasten a truss to the opposing hull are removed, and the truss is swung around using its fixed sides as a pivot, by means of the vertical pinning arrangement which permits a swivel action. The truss is swung flush with the side of the barge to remove it as an obstruction when moving the barge through narrow canals, giving a maximum beam of 27 feet, 10 inches.

The building tolerance between the two hulls in the 62-foot aft section is packed with a wood filler made of joints of 4 x 6-inch beams shaved to



At the stern, the horseshoe barge of The California Company has an overall width of 56 feet, with the two hulls separated only by a three- or four-inch building tolerance. The gap is packed with a wood filler and oakum to make water-tight. At the forward end of the barge, the usual eight-foot slot or keyway is present in the space between hulls.

provide a close fit. The filler is worked into the slot, and is then pulled down by means of special toggle bolts sufficiently to keep the timber flush with the top surface of the deck. Water tightness is obtained by calking the crevices with oakum.

The active mud pits are in the aft end of the barge on the starboard side, receiving mud returns from the shale shaker which is located near the longitudinal center of the barge. The pumps are in the aft deck on the port side, counterbalancing the mud pits. In this section, the horseshoe barge is floored over solidly for its 56-foot beam to provide maximum floor space of special advantage for this type equipment. In addition, replacing the ordinarily open slot between barges with solid hull adds bouyance equivalent to the additional eight-foot width provided, to compensate for the weight of the mud pits, the pumps, and the derrick and draw works which are situated directly above this section of the barge.

The mud system of the horseshoe barge employs numerous original innovations designed to facilitate, economize, and increase the efficiency of handling drilling fluids, and has a manifold located in a convenient site on the drilling floor, which permits applying immediate and full pump pressure on the blowout preventer, with precautionary measures to prevent mud contamination of the preventer.

Two standpoints are available and ready for use, with manifolding suitable for transferring mud circulation to either as desired. From a central line which feeds the standpipes, a line extends to a manifold equipped with valves for emergency operation.

Connections which extend from this manifold to the blowout preventer are tied into a special device by which mud contamination of the preventer is averted.

The apparatus consists of a cycinder made of eight-inch pipe mounted vertically just beneath the drilling deck, and filled with clear water, with the line leading to the blowout preventer leaving the top of the cylinder. The manifold is joined to the cylinder by means of a two-inch pipe which enters the top of the cylinder and extends downward, with its open end located at a point near the bottom. Pump pressure applied to the blowout preventer by manipulating the manifold valve is cushioned by the clear water, and mud entering the two-inch pipe inside the cylinder forces the water ahead of it, resulting in water reaching the blowout preventer to activate its motion with the drilling mud being retained inside the cylinder. Connections with a small water pump enable reversing the circulation after blowout preventer is opened, to flush the mud from the cylinder, replacing it with water, where it remains until the blowout preventer is used again.

All lines from the manifold go under the floor and then proceed to their respective attachments in the space between the floor and the drain pan, in such a position as to be out of the way and also subjected to the least possible damage. Unions used for connections are under the floor, and extensions made of flexible hose with couplings are provided to facilitate making proper connections.

Mud returns are carried through a four-inch flow line to the starboard side of the barge where the shale shaker is located. Here, cuttings and foreign materials are removed and ejected overboard, and the mud is directed aft toward the sand trap which is especially designed to increase efficiency of sand removal. An 18-inch ditch conveys the mud between two elements of the trap, with sluice gates located in position to direct flow through either or both of the traps from either direction, to effect sand removal. Either sand trap is bypassed to permit cleaning the other trap, and mud after leaving the traps flows to the tanks.

Tank Arrangement

Another unusual innovation of the barge is evident in the tanks where, instead of using two tanks of equal width for active pits, one unusually wide tank and a narrow tank are used, the latter serving as an additional sand trap. Overall efficiency is enhanced by this design, as larger active mud pits are made possible to accommodate increased quantities of mud, whereas mud flowing through the first tank, regardless of its width, tends to deposit sand along both sides and follow a narrow channel through the center. Design of the first tank of narrow width accomplishes the same result, with additional space provided for constructing a wider active tank. Arrangement of sluice gates allows the narrow tank to be bypassed for cleaning in which case flow is directed into the main tanks from the sand traps.

From the sand traps the fluid follows a ditch to the lower end, where flow is reversed as it enters the narrow tank with a full depth of 5½ feet. This tank is 38 feet long, and at its upper end, flow is directed through a sluice gate into the main tank, which is also 38 feet long but divided by a steel baffle into two sections of equal width with a sluice gate between. Each section is equipped with an eight-inch suction, and is so adapted that either section may be used while the other is being cleaned.

Served by two pumps, mud may be taken from either suction by either of the pumps. A manifold permits using either pump for either of the two standpipes, while additional manifolding on the return lines to the pits permits circulating and conditioning mud in the two reserve pits to allow reserve mud to be maintained properly conditioned at all times.

Provisions are made for empting the pits by means of ten-inch dump valves flanged to the outside of the hull and provided with ball joints to permit erection of an extension reaching to shore to avoid contaminating the water. Through the valves, the elongated pit used as an auxiliary sand trap may be dumped, or either end of the active pits, or the regular sand traps.

In addition to the two reserve mud pits, mud facilities include a fresh water supply stored in three hull tanks located under the derrick deck, on the shale shaker side of the barge. Other provisions for efficiency in handling mud include a large mud storage room on the aft deck of the barge, and the usual hoppers, jets, and other mixing equipment for proper conditioning of the drilling fluids.

The California Company's horseshoe barge represents an advance in design, successfully eliminating normal unbalanced conditions which are often present in conventional type barges, and offers extra floor space and streamlined devices for handling mud.

A conventional eight-foot slot extends from the bow of the barge to a point under the derrick, where, by means of "blisters" or offsets on the inside of each hull, the two hull sections are brought together. Elimination of the slot on the aft half of the horseshoe barge adds buoyancy to the end where the pumps and other heavy equipment are located, and also provides extra floor space.

Seasonal Trends of Production and Products Stocks Extended Normally

The industry's operations in the week ended August 24 were fairly close to those in the previous week, and seasonal trends of production and stocks of products were extended normally.

U. S. crude production of 4,836,000 barrels daily was 7000 a day less than in the preceding week and 56,000 a day or 1.1 percent less than the output of 4,892,000 daily in the like week last year, when output was tapering off from the wartime peak.

Crude run to stills at U. S. refineries averaged 4,866,000 barrels per day in the week of August 24 this year. Although this was 41,000 a day less than in the previous week, it was more than domestic production by 30,000 barrels daily, and was only 21,000 barrels a day or 4/10 of 1 percent less than the runs of 4,877,000 daily in the week ended August 25 last year.

Stocks of crude in the U. S. totaled 225,583,000 barrels as of August 17, the Bureau of Mines reported. They had increased 1,485,000 barrels during the week and were then 13,673,000 barrels of 6.5 percent above the level of 211,910,000 barrels at which stocks stood August 18 last year.

Production of gasoline, including natural blended at refineries, amounted to 14,639,000 barrels in the week of August 24, a decrease of 563,000 barrels from that of the previous week and 1,588,000 barrels or 9.8 percent less than the 16,227,000 barrels produced in the like week last year. Stocks of finished and unfinished gasoline were lowered by 785,000 barrels to the level of 86,251,000 barrels. That amount was 1,664,000 barrels or 2.0 percent more than the 84,587,000 barrels reported on hand a year previously.

Distillate fuel production of 5,649,000 barrels during the week ended August 24 was 303,000 barrels above output the week before and was 877,000 barrels or 18.4 percent in excess of production in the corresponding week last year when 4,772,000 barrels were produced. Stocks of distillate were increased during the week by 2,488,000 barrels and rose to 51,405,000 barrels. That amount was 11,386,000 barrels or 28.4 percent more than the 40,037,000 barrels produced in the comparable week a year ago.

Residual fuel production of 8,126,000 barrels during the week was 263,000 barrels less than output the week before and 1,207,000 barrels or 12.9 percent less than the production of 9,333,000 barrels in the week ended August 25, 1945. Stocks of residual fuel were increased by 234,000 barrels, having risen to 42,061,000 barrels. That amount was 5,551,000 barrels or 11.9 percent more than the 46,510,000 barrels held a year previously.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod.		Runs to Stills		Crude Stocks		Gasoline Stocks		Gasoil and Distillate Stocks		Residual Fuel Oil Stocks	
	Barrels Daily	Week Ended	Barrels Daily	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended
Highs:												
1941	4,337	11–22	4,120	10–18	266,187	3–29	99,727	3–29	[1]54,983	11–15	102,448	1– 4
1942	4,337	2– 7	3,961	1– 3	263,208	3–28	[1]109,281	3–14	47,861	11–14	95,857	1– 8
1943	4,436	11–13	4,331	12– 4	245,752	5–29	94,159	3–20	47,187	11–27	72,881	1– 2
1944	4,762	9–30	4,798	12–30	240,992	1– 1	89,162	4– 1	48,162	10–28	64,744	10– 7
1945	4,944	7–21	[1]5,140	8–18	227,554	10–13	99,012	3–24	45,341	11–17	56,074	1– 6
1946	[1]4,961	6–15	4,907	8–17	229,430	3– 2	105,233	2–16	51,405	8–24	52,061	8–24
Lows:												
1939	[3]1,601	8–26	3,125	2–18	[2]229,127	10–12	71,152	10– 7	20,722	4–15	105,397	4– 3
1941	3,364	1–11	3,490	1–18	240,399	11–15	79,923	10– 4	28,382	4–12	90,914	7–13
1942	3,297	7– 4	3,393	5–23	231,896	12–12	75,934	12– 5	29,240	4–25	72,962	12–26
1943	3,821	1– 9	3,579	3–18	232,191	1– 9	68,182	10–16	30,732	4– 3	57,596	12–25
1944	4,357	1– 1	4,228	2–12	220,258	9– 9	76,302	1– 1	30,232	4–19	49,737	3–18
1945	3,621	10– 6	3,409	10– 6	[4]211,813	8–25	70,791	10–13	26,483	3–17	38,548	5–26
1946	4,403	3– 9	4,498	1–12	218,193	1– 5	86,251	8–24	25,131	3– 9	37,289	4– 6

TRENDS OF 1945 AND 1946

Trends in Week Ended	Crude Oil			Gasoline		Gasoil and Distillate		Residual Fuel	
	Production Daily	Runs to Stills Daily	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End
1945:									
January 27	4,727	4,756	221,310	14,957	88,223	4,843	33,561	9,252	51,119
February 24	4,777	4,803	219,351	15,500	95,972	4,958	28,753	9,084	46,713
March 31	4,781	4,677	223,782	14,644	98,758	4,548	26,889	9,184	41,745
April 28	4,805	4,780	223,474	14,633	94,068	4,636	28,273	9,379	39,813
May 26	4,887	4,950	222,831	15,194	89,121	4,667	29,184	9,670	38,548
June 30	4,903	4,999	220,781	15,546	86,472	4,910	32,213	9,077	40,488
July 28	4,930	4,996	218,507	16,106	86,008	4,598	36,071	9,586	42,283
August 25	4,892	4,931	[4]211,813	15,986	84,693	4,960	39,782	9,356	46,201
September 29	4,357	3,812	222,387	11,913	79,552	3,940	43,689	7,047	46,853
October 27	4,273	4,838	224,230	15,530	74,335	5,159	43,472	8,691	45,943
November 24	4,469	4,648	219,363	15,681	83,184	4,802	45,258	8,800	47,474
December 29	4,474	4,729	218,918	14,546	95,205	5,055	36,651	8,765	42,447
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,293	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,357	28,240	8,738	37,746
April 27	4,672	4,685	224,443	14,228	99,631	5,568	30,466	9,204	39,404
May 25	4,759	4,857	222,214	14,322	95,769	5,463	32,973	8,908	43,368
June 29	4,957	4,854	223,883	14,500	92,333	5,325	37,762	8,828	46,447
July 27	4,926	4,896	223,756	14,535	88,626	5,817	44,316	8,217	49,517
August 3	4,881	4,849	224,832	14,837	86,741	5,556	45,670	8,273	50,138
August 10	4,821	4,806	224,098	14,696	87,016	5,735	48,030	8,201	51,613
August 17	4,843	4,907	225,583	15,202	87,036	5,346	48,917	8,389	51,827
August 24, 1946	**4,836**	**4,866**	.....	**14,639**	**86,251**	**5,649**	**51,405**	**8,126**	**52,061**
August 25, 1945	4,892	4,887	[5]211,910	16,227	84,587	4,772	40,037	9,333	46,510
Change:									
In Week	—7	—41	+1,485	—563	—785	+303	+2,488	—263	+234
In Year	—56	—21	+13,673	—1,588	+1,664	—877	+11,368	—1,207	+5,551
In Year	—1.1%	—0.4%	+6.5%	—9.8%	+2.0%	+18.4%	+28.4%	—12.9%	+11.9%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922, due to shut down of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, August 18, 1945.

API Nominating Committee Named in Advance of Meet

Nominees for officers, members of the executive committee and members of the committee on memberships of the American Petroleum Institute will be made by a committee named by President William R. Boyd, Jr., as follows:

Robert E. Wilson, Standard Oil Company (Indiana), Chicago, chairman; Robert H. Colley, The Atlantic Refining Company, Philadelphia; H. D. Collier, Standard Oil Company of California, San Francisco; J. C. Donnell, II, Ohio Oil Company, Findlay, Ohio; W. H. Ferguson, Continental Oil Company, Denver; Walter S. Hallanan, Plymouth Oil Company, Pittsburgh; B. A. Hardey, Louisiana Mineral Board, Shreveport; George A. Hill, Jr., Houston Oil Company of Texas, Houston; B. Brewster Jennings, Socony-Vacuum Oil Company, New York; Reese H. Taylor, Union Oil Company, Los Angeles, and H. C. Wiess, Humble Oil & Refining Company, Houston.

Heretofore such a committee has been appointed from the floor of the opening session of the board of directors at the Institute's annual meeting, set this year for November 11-15 at Chicago. The change was authorized recently at Dallas by the directorate.

Institute by-laws permit members to make suggestions for nominations to the new committee.

☆ California

Los Angeles County Strike May Be of Major Importance

Oil discovery in Los Angeles County may be of major importance; West Newport Beach field looms as first-rate producing area; latest completion in East Los Angeles field fails to flow and is placed on pump; 2 gas tests to be drilled in northern counties; 10-week fishing job concluded in Kettleman Hills Middle Dome wildcat and operator prepares to set long casing string.

Los Angeles County: A discovery of probable major importance has been made a few miles south of Los Angeles in suburban Gardena by British-American Oil Producing Company and The Texas Company, whose joint project, Bodger 1 in 22-3s-14w was brought in this week. Production is from just above the Schist. British-American did the operating.

Total depth is 9154 feet. Producing interval is from 9087 feet to bottom. On a formation test, preceding completion with the tester open an hour, and with a 2000-foot water cushion, the fluid reached the surface in 25 minutes, blew out the cushion and flowed a full stream of clean oil through a 2-inch line with a good volume of gas.

The discovery is hailed as an achievement in exploration in an area where, despite several failures, wildcatting has persisted. The Ohio Oil Company tried twice in the last 18 months to find oil in the area. Ohio's Gardena Community 6-1, 1½ miles east, in Sect. 24, was drilled to 10,594 feet just a year ago and flowed by heads at a 500-1000 barrel rate for a while, but died. Water cut ran as high as 90 percent and the well finally had to be abandoned. Since then Ohio has drilled and abandoned Gardena Community 4-1 in Sect. 23. This test went to 10,040 and swabbed salt water.

In the East Los Angeles field, Richfield Oil Corporation's recent completion, Vail 2 in 16-2s-12w, lacks the kick and is being placed on pump. Company's Edison 1, also in Sect. 16, is swabbing. Total depth is 8000 feet. C. G. Willis' Simons 1 in Sect. 15 has been abandoned at 9800 feet and Chanslor-Canfield Midway Oil Company's Bandini 1 in Sect. 21 is scheduled for abandonment if uphole tests now being made are unsuccessful. Earlier feeling that this area would develop into a major oil field is now being discounted to some extent.

Orange County: The West Newport Beach field appears likely to grow into a major producing area. Outstanding developments were lacking the past week, but the entrance of Standard Oil Company of California and Tide Water Associated Oil Company in the area is considered significant.

In the Yorba Linda area, northwest of the Richfield field, location has been staked for a joint test on a 500-acre block by 4 operators: Basin Oil Company, C. G. Willis, Aero Electric Corporation, and General Exploration Company, with the latter company doing the operating.

Ventura County: Honolulu Oil Corporation and Signal Oil and Gas Company have staked a wildcat, Bates 1, in 36-4n-25w, 2 miles northwest of the Rincon field.

Santa Barbara County: Ohio is preparing to abandon Prevedello 1, a wildcat in 1-4n-28w, 2 miles northeast of Goleta. Formation tests recovered muddy water showing some gas. Total depth is 3266 feet.

Butte County: General Petroleum Corporation will drill a gas test, Llano Seco 1 in the Willows area, 33-20n-1w.

Yolo County: Shell is grading location for a wildcat gas test, Unit 1-1 in the Winters area, 19-8n-1e. This is a short distance north of the Winters gas field.

Kings County: Drill pipe fish has all been recovered in Standard's Kettleman Hills Middle Dome wildcat, 30-V-73 in 30-23s-19e. The well has been in mechanical difficulties since the first week in June. Operator is preparing to run casing. Total depth is 10,921 feet.

Kern County: Pacific Western Oil Corporation's National Royalties 1, 5-26s-22e, became the deepest wildcat in the San Joaquin Valley when it passed Belridge Oil Company's 62-W-13, a South Belridge deep test. Pacific Western's well is drilling below 13,370 feet, with the Belridge well a few feet behind.

Ridge Hill Oil Company of Los Angeles has acquired a 300-acre lease and 4 small producing wells in the Grapevine-Tejon area from the Hilo-Metzenbaum interests. New owner said additional development was not an immediate prospect.

☆ Oklahoma

Kendrick Field Extended; South Moore Is Defined

Kendrick field gets ½-mile south extension; North Lindsay field apparently extended northeast; South Moore pool defined; New pool looms in Hughes County; Pontotoc County has new gas

Wells Completed in the United States in Week Ended August 31, 1946

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second or third issue of each month. More detailed data on wildcats published in third or fourth issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS: *Oil	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	Cumulative: This Year	Last Year
Alabama	....	....	....	....	....	....	....	....	....	....	....	....	10	23
Arizona	....	....	....	....	....	....	....	....	....	....	....	....	1	....
Arkansas	2	....	....	1	3	....	....	....	1	1	4	5	123	127
California	24	1	....	1	26	....	....	....	5	5	31	26	1,234	1,465
Colorado	5	....	....	....	5	....	1	....	....	1	6	2	95	19
Florida	....	....	....	....	....	....	....	....	1	1	1	1	17	11
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	2	6
Illinois	27	....	....	4	31	....	2	....	12	14	45	37	1,504	1,207
Indiana	5	....	....	4	9	....	....	....	2	2	11	13	335	224
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Kansas	22	7	1	6	36	....	1	....	4	5	41	41	1,369	1,105
Kentucky	6	1	....	3	10	1	....	....	2	2	13	9	413	374
Louisiana	12	3	....	8	23	....	3	....	5	8	31	22	862	678
North Louisiana	8	3	....	2	13	....	....	....	2	2	15	17	475	250
South Louisiana	4	....	....	6	10	....	3	....	3	6	16	5	387	428
Michigan	6	3	....	6	15	....	....	....	6	6	21	26	517	510
Mississippi	2	....	....	....	2	....	....	....	2	2	4	2	146	254
Missouri	....	....	....	....	....	....	....	....	....	....	....	1	22	37
Montana	5	....	....	1	6	....	....	....	....	....	6	5	174	151
Nebraska	....	....	....	....	....	....	....	....	....	....	....	2	3	3
New Mexico	5	2	....	....	7	1	....	....	1	1	9	9	275	293
New York	15	1	10	....	26	....	....	....	....	....	26	27	800	740
North Carolina	....	....	....	....	....	....	....	....	....	....	....	....	1	1
Ohio	9	11	....	4	24	....	....	....	1	1	25	27	792	637
Oklahoma	32	11	1	10	54	4	2	....	6	8	66	67	1,836	1,585
Oregon	....	....	....	....	....	....	....	....	....	....	....	....	2	....
Pennsylvania	28	6	15	....	49	....	....	....	....	....	49	47	2,100	1,965
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	2	3
Texas	63	8	....	19	90	2	10	....	34	44	136	157	5,403	4,880
E.Tex.Bor.Co.'s	4	1	....	....	5	....	1	....	1	2	7	8	124	62
Rest of E. Texas	7	....	....	3	10	....	....	....	3	3	13	25	366	145
North Texas	20	....	....	6	26	....	5	....	6	11	37	23	1,564	1,169
W. Central Tex	5	2	....	4	11	1	1	....	3	4	16	17	421	322
West Texas	....	....	....	....	....	....	1	....	11	12	12	34	1,113	1,203
Tex. Panhandle	2	3	....	....	5	....	....	....	....	....	5	4	250	408
G. Coast, Upper	4	1	....	2	7	....	....	....	4	4	11	10	430	467
G. Coast, Lower	16	1	....	3	20	1	....	....	2	2	23	24	741	706
Southwest Texas	2	....	....	....	2	....	2	....	2	4	6	8	286	334
S. Central Texas	3	....	....	1	4	....	....	....	2	2	6	4	108	64
Utah	....	....	....	....	....	....	....	....	....	....	....	....	2	....
Washington	....	....	....	....	....	....	....	....	....	....	....	....	1	1
West Virginia	2	7	....	4	13	....	....	....	....	....	13	16	480	529
Wyoming	2	....	....	....	2	....	....	....	....	....	2	6	106	108
Total U.S.	272	61	27	71	431	8	19	....	82	101	540	548	18,627	16,937

* Includes distillate wells. † Includes salt water disposal wells.

field; attempt being made to extend Guymon-Hugoton field.

Lincoln County: The old Kendrick field has been given an extension ½-mile south by Wofford, Nicholson & Rose Drilling Company's Naylor 1, NW SW NE 7-15n-5e. Recently completed for 19 million cubic feet of gas, the well was drilled to 3572 feet. Salt water was found at this depth, and the well was plugged back to 3569 feet. Prue sand was shot from 3528-58 feet with 108 quarts of nitro and the well was tested for the flow of gas, with a slight show of oil and a spray of water.

McClain County: The North Lindsay field apparently has been extended ¾ mile northeast by Frank Russell's Little 1, NE NW NE 22-5n-4w. It flowed 65 barrels of oil an hour through ½-inch choke from perforations in the Viola lime, topped at 11,150 feet. Total depth is 11,510 feet, but operators were not revealing the formation.

Cleveland County: Two flank wells on the South Moore field apparently have defined the field, both on the north and south rims. On the north side, The Carter Oil Company's Turner 3, NE NE NW 26-10n-3w, was drilled to 8181 feet, but tested for several days without success. On the south side, Sinclair Prairie Oil Company's McDonald 3, NE SE NE 34-10n-3w, was drilled to 8288 feet and tested water.

Hughes County: B. C. Deardorf, Oklahoma City operator, apparently is opening a new pool 4 miles east of Holdenville with Gentry 1, NW NW NE 14-7n-9e. Booch sand was topped at 2874 feet, with total depth 2895 feet. Pipe was set atop the sand and shot with 50 quarts of nitro. After cleaning out, the well flowed through tubing at an estimated 200 barrels of oil a day. Testing continues, with pay coming from 2874-94 feet in the Booch. Location is on a block assembled by Earl Sadler and Kenneth Ellison, with geology worked by Ellison.

Pontotoc County: A new gas field has been opened west of the Beebee oil district by C. L. Carlock, Oklahoma City and Wichita, Kansas, operator. His Larmon 1, NW SW SE 31-5n-4e, was reported making 12 to 15 million cubic feet of gas per day from Pennsylvania sand at 1997-2011 feet. Location is on a block of 400 acres, assembled by Ralph L. Fillmore, Jr. A number of years ago Anderson-Prichard Oil Corporation drilled a small oil well about a mile from the location, but the well soon depleted itself.

Texas County: Cities Service Oil Company will attempt to give the Guymon-Hugoton gas field an extension of approximately 10 miles west at Buzzard 1, 28-4n-12eCm. In the interval between the location and the major gas reserve, there are 2 gas wells, both isolated. Cities Service holds a large block around the location.

☆ Kansas

McPherson County Bitikofer Pools Are Apparently Linked

Two Bitikofer pools apparently linked; McPherson County wildcat fails to show after acid and will be deepened; Pawnee County gets new oil pool; Cities Service gets 3 good gassers in Hugoton; Couch pool gets 200-barrel well.

McPherson County: Bitikofer and the Bitikofer North oil pools apparently were linked when Williams & Hess' Young 1, SE NW SW 26-18s-1w, made 100 barrels of oil a day natural from the Mississippi chat. The well also is making 2 million cubic feet of gas daily from the same formation. The new well is ¼ mile north of the Bitikofer pool, and ¾ mile south of the new Bitikofer North pool, indicating that the 2 pools will be linked up. The Mississippi chat was topped at 2885 feet at the Young.

The J. M. Huber Corporation will drill Leffler 1, SW SW SW 24-19s-1w, deeper into the Mississippi chat, after 2 acid treatments failed to produce at 2897-2934 feet. Good shows were logged in the formation at that depth, but efforts so far have failed to bring in the well. The test is a mile north of the Bitikofer North pool.

Pratt County: A pool definitely has been opened by The Lion Oil Company's Chance 1, NW NW NW 4-27s-13w. The well was completed for 150 barrels of 38 gravity oil per day from the Arbuckle lime at 4432-40 feet. The wildcat is 2 miles north of the Iuka pool.

Haskell County: Cities Service Oil Company has given the Hugoton gas field 3 more wells with Dewell 1, CS½ SE NW 17-29s-33w, Unruh "B" 1, CE¼ SE NW 7-29s-33w; and Hall 1 "K," NE NE SW 5-29s-34w. The Dewell has been completed for an open flow of 6,470,000 cubic feet a day from sand at 2790 feet; the Unruh made 8 million cubic feet daily on an open flow test at 2785, and the Hall made 2,890,000 cubic feet through perforations at 2432-2640 feet.

Cowley County: The Couch pool has been given a 200-barrel a day well by National Cooperative Refining Association. Kennedy 4, SE SW SW 12-30s-5e, is producing from the Bartlesville sand at 2783-2833 feet. The flow came after an 80-quart nitro-shot.

☆ New Mexico

Eddy County Test Has Gas Flow from Middle Permian

Eddy County wildcat has small gas flow from middle Permian, being first deep production for county; thick Pennsylvanian beds recorded by De Baca County wildcat; 3 Ellenburger wells completing in Brunson field.

Eddy County: Sanders Brothers et al's Hultman 1, C SE NE 32-16s-26e, wildcat that was temporarily abandoned at 6761 feet in Pennsylvanian as the deepest in the county, was showing 300,000 cubic feet of gas after using acid at 5280-90 feet. Further tests will be made to try for a commercial producer. Grayburg Oil Company et al's Keely 1-A, Pennsylvanian test for the Grayburg Jackson field, was drilling at 6580 feet, having completed its original depth contract. Top of the Abo was tentatively called at 6240 feet.

Wildcats: The Pure Oil Company's Federal 1, 31-3n-28e, Taiban area, De Baca County, was drilling sandy lime at 6060 feet, having entered the Pennsylvanian at 5165 feet with elevation of 4131 feet. The Abo was topped at 4000 feet. In Chaves County, Magnolia Petroleum Company's Black Hills Unit 1 was drilling in anhydrite at 2520 feet. Byrd & Fros., Inc., and P. B. English's Hargrove Nederal 1, 4-27n-60w, San Juan County 7000-foot project, was drilling at 3110 feet. Nominal show of oil was passed up at 2984-95 feet after an unsuccessful drill-stem test.

Lea County: Rowan Drilling Company and Penrose's Walden 3, NE NW 15-22s-37e, and 1⅛ miles southeast outpost for the Brunson deep area, flowed 722 barrels of 45.3-gravity oil initial through 10/64-inch choke from perforations at 7494-7565 feet in Ellenburger topped at 7490 feet. Humble Oil & Refining Company's Greenwood 8, south offset to the Ellenburger discovery for the Brunson area, excluded water after scaling lower perforations.

Tide Water Associated Oil Company's Brinson 1, SE SE 4-22s-3e, was completing from Ellenburger section at 7360-7582 feet followed by granite to 7584 feet. Both tops are the highest among the producers. Penrose and Rowan's Elliott 4-B-9, NE NW 9-22s-37e, north offset to the discovery, was perforating to complete from Ellenburger at 7828-7972 feet with granite below. Gulf Oil Corporation's Sticher 2, north offset, entered Ellenburger at 7813 feet, and was due to run pipe at 7843 feet after favorable showing through tester.

☆ West Texas

One-Well Area Has 24 Tests Drilling and Scheduled

Twelve new operations assigned the Block 12 7200-foot Clear Fork field, making total of 24 drilling and scheduled tests on short-term leases for the 1-well area; Ordovician discovery in Crockett County reaches water in Ellenburger; Winkler County lists its fourth Glorietta (Holt) discovery; Apex of Ellenburger zone in Wheeler field shifted east into Ector County.

Andrews County: Development of the Block 31 1-well field, where 35 160-acre University leases require production by November 14 to forestall expiration, began assuming major proportions as result of the awarding of drilling contracts for 12 additional test by 4 companies. The favorable showing of 2 wells in process of completion by The Superior Oil Company caused the companies to stage the drilling race and risk dry holes due to remoteness of some of the projects from production. The area under development extends east-west 3¼ miles and 2¼ miles north-south, with tests within ½ mile east and west of an Ellenburger failure. If productive, all tests will require from 1 to 3 offsets.

Superior's University 4-B-12, C SE NE Sect. 16, Block 12, west offset to the discovery and structurally low on the upper markers, flowed 615 barrels of oil, with gas-oil ratio 570/1, through choke after using 8000 gallons of acid in the Lower Clear Fork pay at 7141-7235 feet. Acid treatment was pending for upper section at 7063-7141 feet. The company's University 3-A-12, a mile south of the discovery and also low on upper markers, has landed pipe to complete from broken pay at 7078-7245 feet. The Texas Company's University 1-Q, south offset to the discovery, entered the Glorietta 2 feet high, and was drilling at 6830 feet.

New operations assigned the area involve 8 by The Atlantic Refining Com-

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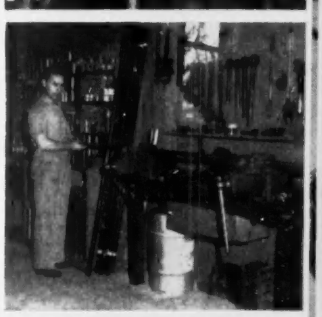

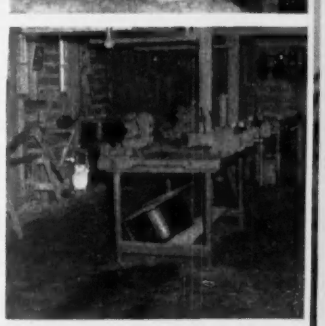

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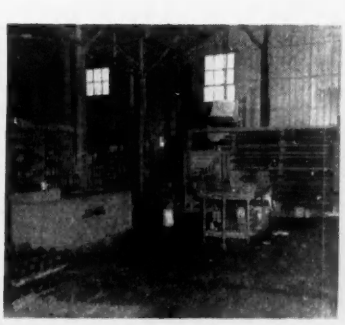

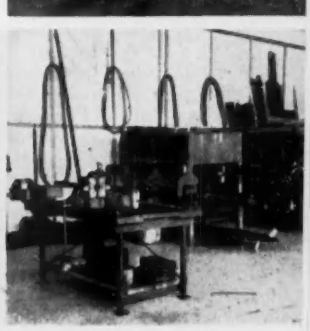

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pany, which is drilling on 5 tracts; 2 by Seaboard Oil Company; and 1 each by Plymouth Oil Company and The Texas Company. Normal completion time for producers in this area will vary from 6 to 8 weeks. The oil is comparatively low in sulphur content, but only 32.5 gravity and subnormal for this zone. Several carriers have projected lines into the area.

Sinclair Prairie Oil Company's University 1-160, C NW NW Sect. 41, Block 13, ½ mile east of 8500-foot production in the South Fullerton Devonian 2-pay field, was drilling at 8440 feet, having flowed at a rate of 45 barrels of 42-gravity oil per hour when tester was used in Pennsylvanian at 8240-8300 feet.

Crockett County: Stanolind Oil & Gas Company's University 1-GG, previously listed as an Ellenburger discovery, reached the water level in drilling to 8384 feet, or 409 feet in the formation, and cemented 7-inch casing at 8298 feet. This wildcat yielded gas-distillate in the upper zone, and entered the oil zone at 8355 feet. Last drill-stem test yielded 6985 feet of 41-gravity oil and 15 feet of sulphur water at 8355-84 feet.

Wildcats: Shell Oil Company's Clark 1, Glasscock County, was drilling dolomite at 10,360 feet in Ellenburger, topped at 9840 feet with elevation 2663 feet. Six drill-stem tests of this zone yielded salty and sulphur water, but nominal show of sweet gas and high-gravity oil was passed up in the Mississippian, entered at 9610 feet. In Reeves County, Argo Oil Corporation's Roberts 1 was drilling sandy-shale at 13,180 feet.

Winkler County: Ralph Lowe et al's Sealy-Smith-Stanolind 1, C SW SW G&MMB&A 71, Block A, 2⅜ miles west by south of the North Monahans 6100-foot Clear Fork field, flowed 44 barrels of oil hourly through 1-inch choke after using 5000 gallons of acid through Glorietta (Holt) perforations at 5220-80 feet. This wildcat was plugged back from 6500 feet, having tested water in the Clear Fork. This strike and an earlier Glorietta discovery to the south of the North Monahans area has resulted in the starting or authorization of 10 tests on Stanolind's 31,770-acre Sealy-Smith lease, with the latter accounting for 6 and the remainder are on its farmouts.

Wheeler Field: Sun Oil Company's Wheeler 1-A, ¼ mile northwest outpost and slightly higher on pre-Permian markers than nearest production, was deepening 10 feet after flowing 330 barrels of oil, including 5 percent acid sludge, on 24-hour test partly choked. This production was from open hole at 10,601-10,630 feet in Ellenburger, topped at 10,587 feet. It also will be produced from Devonian perforations. Phillips Petroleum Company's TXL 1-G, ½ mile east outpost and in Ector County, lost some of its abnormally high structural relief that was recorded in drilling Devonian and Silurian pays when it entered the Ellenburger at 10,430 feet, or 161 feet high to nearest producer. This outpost was drilling dolomite at 10,675 feet, and probably will establish the oil-water contact before running pipe for dual completion. Customary drill-stem tests were not run in the Ellenburger because of the well's favorable position.

Keystone Field: Continental Oil Company's Walton 1-D, west offset to Ellenburger production and abandoned April, 1945, at 10,756 feet, has been reworked as a 32-barrel pumper from Holt perforations at 4760-4860 feet. This well extends the Holt pay a mile west. Humble's Walton 1-E, also a west side Ordovician failure, was making occasional flows, with a small amount of water, from Silurian perforations at 8247-8550 feet. It will make a commercial pumper. Gulf Oil Corporation's Keystone 55-E, southeast edge of the Ellenburger area, will be plugged back to exclude water, having tested steady flow of 201 barrels of oil and 86 barrels of water daily through 5/32-inch choke from Ellenburger at 9970-10,038 feet.

Crane County: Atlantic's University 1-M-31, southeast edge of the Block 31 field, flowed 123 barrels through ¼-inch choke for completion after 3 nitro shots and acid treatment of Devonian at 8687-8900 feet, giving the company 10 Devonian and 7 dually completed from Devonian and Ellenburger, and a failure. The company is nearing the pay on the last of its 19 tests drilled on as many 160-acre leases to forestall November 14 expirations. Phillips, with 2 operations, and Champlin Refining Company are certain to complete before their deadline.

☆ Central West Texas

Swastika Wildcat Has Flowing Production In Jones County

Swastika wildcat yields flowing production in Western Jones County; prospective oil discovery in Taylor County given offset.

Jones County: V. E. Autry, Ernest Wilson and Paul Steed's Minter 1, northeast corner of S.P.Ry. 39, Block 2, and 4¼ miles southwest of nearest production, was rated at 40 barrels of oil hourly on preliminary test of perforations at 3439-43 feet in the top of the Swastika. This discovery also logged promising oil shows in the Noodle Creek and Sunsight, topped at 2710 feet and 3358 feet, respectively.

Taylor County: West Central Drilling Company-Unggren & Frazier's Kincaid 1, NW NW NW T&P Ry. 27, Block 16, 3¼ miles southeast of the Reddin field, failed to exclude bottom-hole water and is making retest through perforations of sand at 2617-47 feet. A drill-stem test indicated a probable oil producer. Owners are starting Brown 1 as a west offset.

☆ North Texas

National Multi-Pay Field's Development Accelerated

Development of National multi-pay field to be accelerated through an independent operator having authorized 11 tests, including 3 on church lots, in the Harrold townsite; casing is arriving for sizeable drilling program in near-by Fargo field; Jack County wildcat testing small volume of gas; Madden field records first Ellenburger production.

Wilbarger County: M. T. Flanagan, Longview, Texas, operator, has authorized 11 tests on as many small tracts in the Harrold townsite and on the northwest edge of the National field. This area has accounted for 3600-foot Rock Crossing and 4900-foot Ellenburger producers, while the 3200-foot Canyon is capable of production. National Associated Petroleum Company and Humble Oil & Refining Company have completed 33 flowing and pumping wells.

Amerada Petroleum Corporation, largest lease owner in the Fargo field, is moving in casing to undertake its twin and triple location development program that was terminated by war-time spacing restrictions. The company has in excess of 30 proved drilling sites, and will operate a minimum of 2 contract rigs. Other lease owners are planning to participate in the development.

Grayson County: Standard Oil Company of Texas' Mitchell 1, Sherman prospect, was drilling barren Ellenburger at 11,495 feet, having penetrated about 245 feet of this zone without shows. The company's Grayson County Poor Farm 1, which will test Strawn oil sands passed up by the deep test, was drilling at 5090 feet.

Jack County: Continental Oil Company's Cherryhomes 1-C, Florida Payne Survey A-1564, was showing about 250,000 cubic feet of gas daily while swabbing 1½ barrels of fluid hourly from Bend perforations at 4590-4600 feet.

Montague County: Continental's Stephens 1, P. H. Dooley Survey and east outpost for the McNutt 6-well Viola field, which is the only producing area in the state from this zone, was running pipe at 6975 feet in Simpson, topped at 6858 feet. The Viola was entered at 6746 feet, or 6 feet low.

Wichita County: Wayne Hammon and Hanlon & Buchanan, Inc.'s D. G. Parker 1, southeast corner of Block 26, Palo Pinto County School Lands, and on the northwest edge of the Madden field, proved a deeper pay in flowing 126 barrels of 42-gravity oil, with gas-oil ratio of 200/1, through 24/64-inch choke after using acid in Ellenburger open hole at 5248-68 feet. The Ellenburger has been explored unsuccessfully in the field proper.

☆ East Texas

Wood County Woodbine Strike Shows for Two-Sand Pumper

Woodbine strike on Oak Grove prospect, Wood County, showing for 18-gravity pumper from 2 sands; gas-distillate show scored by Van Zandt County wildcat; Quitman field assigned first deep test.

Wood County: Bobby Manziel and Billy Bridewell's Amason 1, Hazard Anderson Survey 274, confirmed favorable drill-stem test of the Woodbine in the Post Oak area in swabbing 5 to 10 barrels of 18-gravity asphalt oil from perforations at 5237-44 and 5466-88 feet. The fault was cut at the 5095-foot level. This strike is ½ mile southwest of Fisher & Jackson's McCarley prospect that showed extremely low-gravity oil from the sub-Clarksville, but has not been produced due to the oil congealing. Dry holes indicate that the productive area will be extremely narrow.

Quitman Field: Shell Oil Company is starting Goldsmith 12, near the southeast corner of the Ed. Goodsir Survey and between Paluxy failures, as the first

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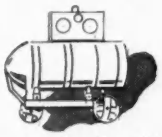

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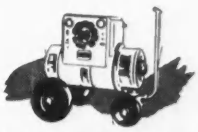

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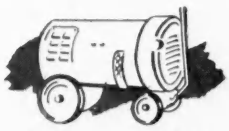

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Travis Peak test for the large structure. More than a dozen tests were drilled through the Paluxy, which is the main source of production, to the Glen Rose for geological information in selecting site for the initial deep test.

Navarro County: Temple Hargrove et al's Wallace 1, John Jones Survey and near Woodbine production along the Richland-Currie fault, was flowing oil and drilling fluid at an estimated rate of 10 barrels hourly while cleaning itself from perforations at 5447-54 feet. Production is from the Rodessa.

Delta Drilling Company's Houston-Magnolia 1, Martins Mill prospect, recovered nominal show of gas and distillate with drilling fluid when tester was used at 8303-22 feet in the Bacon, or Upper Rodessa, and was drilling shale at 8330 feet.

Smith County: Humble Oil & Refining Company's Moseley 1, northwest offset to its Mount Sylvan pool discovery, entered the Austin chalk at 4460 feet and was drilling chalk at 4660 feet.

☆ East Texas Border

Shallow Field, Marion County, Has Flowing Well from Tokio

Shallow field gets flowing well from Tokio sand; Humble's Shelby County well tests oil in Upper Pettit; Waskom area wildcat flows oil from open hole.

Marion County: Completion of a flush oiler near the Louisiana state line has created considerable interest in the pump-studded Shallow field. H. W. Snowden's W. J. Sedberry 1, on a 40-acre tract in the Martin G. Hall Survey, was completed for a potential of 480 barrels of 44.3-gravity oil daily through ⅜-inch choke from 24 perforations in the Tokio sand at 2420-30 feet. Casing pressure gauged 600 pounds and tubing pressure 325 pounds, gas-oil ratio 374/1. Wells in the Shallow field pump from 15 to 40 barrels daily. Reason for the unusual flow of the Sedberry 1 was attributed to a section in the Tokio sand of greater permeability than normally found. Three additional tests will be made in the near future to determine the extent of this highly productive area.

Shelby County: Humble Oil & Refining Company was reported testing Pickering Lumber Company 2, W. D. Woodfin Survey and 4800 feet southwest of the Huxley field discovery well. The well was drilled to a total depth of 7502 feet and perforated at 6652-70 feet and at 6637-47 feet. Former perforations were squeezed. On a 2-hour test, the well flowed 5.2 barrels of 40.8-gravity oil and 6.5 barrels of water from the Upper Pettit sand with a gas-oil ratio of 4500/1.

Harrison County: E. C. Johnston's G. E. Cargill 1, wildcat 16 miles east of Marshall in the Waskom area in the Simpson Halloway Survey, flowed 527 barrels of 41.6-gravity oil from open hole below 5½-inch casing set to 5931 feet with total depth at 5944 feet on a 24-hour potential test. A ¼-inch tubing choke was used on the test, during which time tubing pressure gauged 575 pounds. Gas-oil ratio was 444/1. Production is from the Travis Peak, topped at 5931 feet and extended to 5943 feet.

☆ South Central Texas

Charlotte Extension Try, Atascosa County, Swabs Oil

Southeast extension at Charlotte swabs oil; Fashing area wildcat abandoned; second Buda lime well at Pearsall given potential.

Atascosa County: The Texas Company's Earl D. Scott 1, extension test 2 miles southeast of Charlotte field and a mile south-southeast of Love 1, which is the latest extension test for the field, is swabbing oil on initial tests of perforations at 5294-5305 feet. Total depth is 5404 feet with 5½-inch casing set to 5396 feet. A drill-stem test at 5294-5305 feet recovered a stand of oil and mud and a stand of mud cut with oil and a little water, with no pressure, the test lasting 26 minutes. A drill-stem test below this at 5305-28 feet tested dry and the well was then cored to total depth of 5404 feet. The well is 1900 feet from the east line and 2700 feet from the southwest line of J. Poitevent Survey 3, A-690, in the northwest corner of a 250-acre lease.

Southern Minerals' J. L. Tom 1, wildcat 6 miles southwest of Fashing field, has been abandoned at total depth of 6505 feet. This test topped the Wilcox sand at 3866 feet and the Massive Wilcox was topped at 3929 feet. This well is 467 feet from the southwest line and 1770 feet from the southeast line of the W. E. Tom Brothers Survey 2, A-184, and is 4 miles east-southeast of Campbellton.

Frio County: Snowden Oil & Gas Company, Ltd.'s Cory & McWilliams 8, second Buda lime well in the Pearsall field, has been given official potential of 133 barrels of oil daily on the pump, after testing for several months. Drilled to total depth of 6048 feet, the well was completed from perforations at 6006-31 feet after acidizing with 10,000 gallons. Oil is 39-gravity with 2½ percent water and gas-oil ratio at latest test was 450/1.

☆ Southwest Texas

Yturria Field Outpost Flows Small Amount of Condensate

Yturria field outpost flows small amount of condensate; discovery allowable requested for Kelsey field outpost; 2 Webb County wildcats abandoned.

Starr County: Sun Oil Company's De Garcia 3, deep outpost 3500 feet southwest of Yturria field, gauged a small amount of condensate on latest test. From perforations at 6318-33 feet the well flowed 8 barrels of condensate daily through ⅜-inch choke and with gas-oil ratio of 86,000/1. Tubing pressure was 550 pounds and casing pressure 600 pounds. Total depth is 6380 feet in sidetracked hole with 5½-inch casing set on bottom. This well is in Porcion 98, 3022 feet south-southwest of the de Garcia 2 dry hole.

J. O. Clark has requested discovery allowable rights for Gonzales Unit "A" 2, south end of the Kelsey field. This well produces from perforations at 5709-18 feet, a zone heretofore not productive in the field. Completed August 4, Gonzales Unit "A" 2 flowed on potential 149 barrels of 42.8-gravity oil daily through 5/32-inch choke and with gas-oil ratio of 630/1. Total depth is 5739 feet.

Webb County: Two wildcats have been plugged as dry. O. W. Killam's Servando Benavides 2, 5½ miles northeast of Oilton on the south flank of the old Carolina-Texas field, has been abandoned at total depth of 3072 feet. One test made in the wildcat recovered salt water in open hole at 3067-72 feet. The abandoned test is 467 feet from the north line and 1860 feet from the west line of the AB&M Survey 685, and 1465 feet south-southeast of the Benavides 1 dry hole.

Also plugged was Westbrook Oil Corporation's Mabel Adami 3, 18 miles west of Freer. Drilled to total depth of 1295 feet, casing was set and perforated at 1155-60 feet where salt water with a slight show of oil was swabbed. This abandoned test is located 2½ miles south of the Adami field.

☆ Lower Texas Coast

Wildcat in George West Area Is Flowing Gas-Condensate

Wildcat southwest of George West flows gas-condensate; discovery allowable requested for Slick sand producer at Oakville; wildcat south of Victoria County line testing; Ricardo outpost tests gas-condensate show.

Live Oak County: Continental Oil Company's Mrs. C. W. Burns 2, wildcat 9 miles southwest of George West, has discovered gas-condensate for the area. From perforations at 10,121-132 feet the well developed 1750 pounds surface pressure on drill-stem test, using a 5000-foot water cushion, and recovered 390 feet of muddy water and 60 feet of amber-colored condensate. The test had 3900 pounds bottom hole pressure flowing and 6900 pounds shut in. Production packer is now being run in the well for completion. This well is 660 feet from the southwest line and 1980 feet from the northwest line of the Wesley Sellman Survey. Continental has made a new location in the area 1867 feet north of Burns 2.

Stanolind Oil & Gas Company has asked for discovery allowable rights for L. A. Reagan 1, Slick sand producer in the Oakville field. Drilled to 6738½ feet, Reagan 1 produces from open hole, 7-inch casing being set to 6738 feet. There are 2 other Wilcox producers in the field but they are producing from the Luling sand and are gas-condensate wells. With the exception of these 3 wells, production in the Oakville field comes from the 2600 to 2700-foot Pettus zone. The Reagan 1 was completed July 14 for a potential of 30 barrels of 38-gravity oil daily through ⅛-inch choke and with gas-oil ratio of 17,080/1.

Refugio County: Barnsdall Oil Company's Mrs. E. T. Morrow 1, wildcat south of the Victoria County line and about 1¼ miles southwest of McFaddin field, is making production tests after setting 5½-inch casing to 6140 feet. Total depth is 7165 feet and casing was run after the well "kicked" at this depth. Morrow 1 is 467 feet west of the east line of Edward Perry Survey A-48, and 467 feet south of the San Antonio River dry channel, which is the Victoria County line.

Kleberg County: Kilgore Developers' Lehmann 1, outpost a mile southeast of

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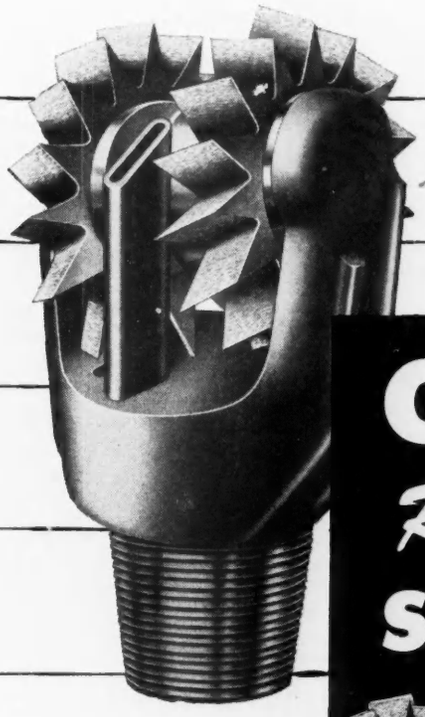
— then use  *the improved*

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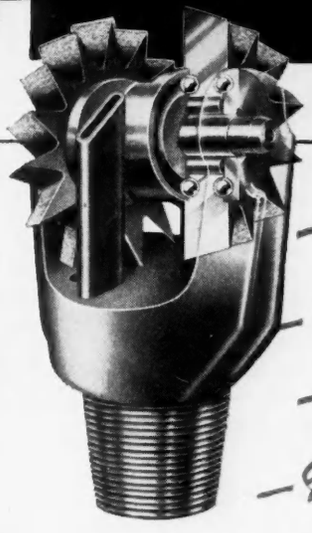

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production in the deep Ricardo field, is making production tests after having a good show of gas and condensate in a sand between 8510-80 feet. The well tried to blow out when this sand was encountered and the operators pumped in cement to kill the blow and then cut and pulled the stuck drill pipe to total depth of 8599 feet. Five and a half inch casing has been set on bottom. This test is in the northeast corner of the E½ SE¼ Sect. 41, Kleberg Town and Improvement Company subdivision.

☆ Upper Texas Coast

Oil Production Confirmed in Area South of Lakeview Field

Oil production confirmed in area south of Lakeview gas field; first submerged lease well at Lane City completed; new shallow sand at Caplan discovered; Olive area wildcat has show of oil and gas; Olive field well being completed.

Wharton County: Oil production has been confirmed in the area south of the Lakeview gas field by Mackey Oil Company's Johnston 1-A, 661 feet east-southeast of Lakeview Oil Company's Johnston 1, discovery oil well for the area. Mackey's well flowed on potential 108 barrels of 24.4-gravity oil, with no water, in 24 hours through ½-inch choke with 425 pounds pressure on tubing and 575 pounds casing pressure. Gas-oil ratio is 632/1. Total depth is 4560 feet with production coming from perforations at 4506-15 feet.

At Lane City the first submerged lease well for the field has been completed by George K. Taggart's State-Colorado River 1, located on a 219-acre submerged lease in the Colorado River. On potential the well flowed 895 barrels of 25.4-gravity oil daily through 7/64-inch choke with 500 pounds tubing pressure and 1000 pounds pressure on the casing. Production is from perforations at 5422-25 feet in a regular field sand.

Galveston County: Roxoil Drilling Company, Inc.'s R. P. Smith Unit 1, No. 21, western outpost to production at Caplan, has production from a new shallow sand for the field. On initial test of perforations at 4031-35 feet the well flowed an estimated 50 to 55 barrels of oil daily through 6/64-inch choke with 395 pounds pressure on tubing and 525 pounds casing pressure. Total depth is 7808 feet with 5½-inch casing set to 5315 feet.

Hardin County: Pan American Production Company's Sternenberg Lumber Co. 1-B, wildcat approximately 7000 feet north of production in the Olive field, flowed oil, gas and salt water with good pressures from open hole below the 7-inch pipe at 9877 feet. Flow has been killed with heavy mud and it is expected that a liner will be set for completion through perforations.

At Olive field Pan America's Sternenherg Lumber Company 3, 3000 feet west and 400 feet south of the discovery well, flowed oil with no salt water while testing and is now cleaning with a gas-oil ratio lower than those of the 1 and 2 wells. This well is being completed from a screen setting in open hole below the 5½-inch pipe at 10,005 feet. Total depth is 10,103 feet. Production in the field is from the Wilcox.

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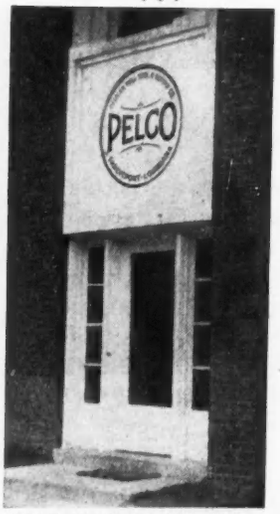

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☆ South Louisiana

Mamou Field Has Three More Wells, Two in New Deep Sand

Three new wells completed at Mamou, 2 in new deep sand; new pay zones discovered at Black Bayou and Venice fields; Alliance area wildcat nearing 14,000-foot depth; outpost on west side of production at Oretta being completed as oil well.

Evangeline Parish: Three new oil wells have been completed in Mamou field by Magnolia Petroleum Company, 2 in a new deeper producing zone. The Hilde Deshotel 1, outpost ½ mile northwest of the discovery, flowed on potential 259 barrels of 47.6-gravity oil daily through 8/64-inch choke from perforations at 11,768-772 feet in the Wilcox. This pay zone is more than 200 feet deeper than the discovery level. The Deshotel 1 topped the Wilcox at 11,500 feet and also had good oil saturation in the Morein discovery sand zone. The L. F. Duos 1, ¾ mile southwest of the discovery just opposite Mamou townsite, flowed on potential 246 barrels of 47.2-gravity oil daily through 8/64-inch choke from perforations at 11,780-790 feet, the sand in which the Deshotel 1 was completed. The Wilcox in this well was topped at 11,505 feet. Third well to be completed was the Walter Reed 1, north offset to the Morein discovery, which flowed 230 barrels of 52-gravity oil daily through 8/64-inch choke from the discovery pay sand at 11,549-570 feet. Topping the Wilcox at 11,502 feet, this well also had good saturation in the deeper pay zone. There are now 6 producers in the Mamou field, 4 wells having been completed during August in the field.

Cameron Parish: Shell Oil Company's Watkins 64, in 8-12s-12w, Black Bayou field, has opened a new deep pay zone for the field. From perforations at 7130-60 feet the well flowed 253 barrels of 39.2-gravity oil daily through ⅛-inch choke with 1275 pounds flowing pressure. Total depth is 8000 feet and 5½-inch casing is set to 7700 feet.

Plaquemines Parish: Tide Water Associated Oil Company's Buras Levee District 32 has been completed in a new sand for the Venice field. On potential the well flowed 260 barrels of 35.3-gravity oil daily through 9/64-inch choke with 2300 pounds flowing pressure and gas-oil ratio 1200/1. Production is from perforations at 11,775-805 feet with total depth of 12,192 feet. There is 1 other well in the field which produces from a deeper sand.

The California Company's E. P. Brady 4, Unit 4, wildcat in the Alliance area 3 miles southeast of Bayou de Fleur field, is drilling below 13,891 feet after running electrical log to 13,701 feet. This test is reported to have well-saturated sands below the 11,185-foot level and may bring in a new producing area for South Louisiana.

Beauregard Parish: Magnolia Petroleum Company's Webster Estate 1, ¼ mile south outpost on the west side of production at Oretta and in 32-6s-11w, is being completed as an oil well. A drill-stem test at 8583-88 feet flowed 88 barrels of clean oil daily with steady pressures. Tubing is being run for completion.

☆ North Louisiana

Wildcat in Bossier Parish Tests Gas in Tight Sands

Plain Dealing wildcat tests gas in tight sands; gas show made in Hill sand in Mooringsport area; DeSoto Parish test draws interest.

Bossier Parish: Barnsdall Oil Company and Sohio Petroleum Company continued efforts to locate permeable producing zones in Carter Burton 1, wildcat about 4 miles north of Plain Dealing in 26-23n-13w. Tests have indicated highly impermeable sands, and the use of nitroglycerine is being considered. Perforations at 6285-90 feet were squeezed and the well perforated at 6362-6405 feet in the Lower Pettit. Total depth is 12,386 feet.

Caddo Parish: In the Mooringsport area, Joe Burnham and N. R. Royall's Noel Unit 1, 11-19n-16w, is drilling below 5127 feet after topping the James sand at 4998 feet. It is believed the Pettit zone will be topped around 5370 feet. A good gas show was made in the Hill sand, topped at 4986 feet, at 4994-98 feet.

DeSoto Parish: Jarvis - Schoomaker-Marcell's Hames 1, in 4-11n-14w, is drilling below 4500 feet. This test is drawing considerable interest and is being watched for possible production from the same formation as that encountered by Phillips Petroleum Company's Nabors 1, discovery well which opened up new gas distillate production west of Mansfield.

☆ Arkansas

Ouachita County Test Drills On After Indications of Oil

Ouachita County wildcat continues to drill after indications of oil; Barnsdall test drills beyond anhydrite; Carter drills below surface pipe in offset to Spirit Lake discovery well.

Ouachita County: Joe Mucher, Trustee's Josie Smith 1, C NE SE SW 30-15s-17w, 4000-foot test 3 miles east of Gum Creek, received oil on a drill-stem test at 2205-25 feet and then cored through sands from 2580-85 feet recovering 4 feet of oil sand. Operators conducted a second drill-stem test — this time at 2569-85 feet, with recoveries at the end of a 13-minute test showing mud and salt water.

Spartan Drilling Company's Sally M. Russell 2, C NE SW NE 27-15s-18w, Gum Creek field, 6 miles east of Stephens, reportedly went on the pump after completion in the Tokio formation at 2454 feet, and had sanded up. Total depth was 2461 feet. Pay sand was topped at 2450 feet.

Nevada County: Barnsdall Oil Company's Stuart 1, wildcat in the center of SW SE 12-14s-23w, was drilling through anhydrite below 3010 feet. Base of anhydrite was encountered at 2658 feet. At 853 feet, 9⅝-inch casing was cemented.

LaFayette County: The Carter Oil Company has set surface pipe and was drilling in C. B. Moore, SW SE 14-16s-25w, south offset to the Spirit Lake field discovery well, Stewart & Lewis' Moore Estate 1, in 14-16s-25w.

Miller County: Carter's Allen Winham 1, C E½ 3-16s-28w, Texarkana field, was on its way to completion as a

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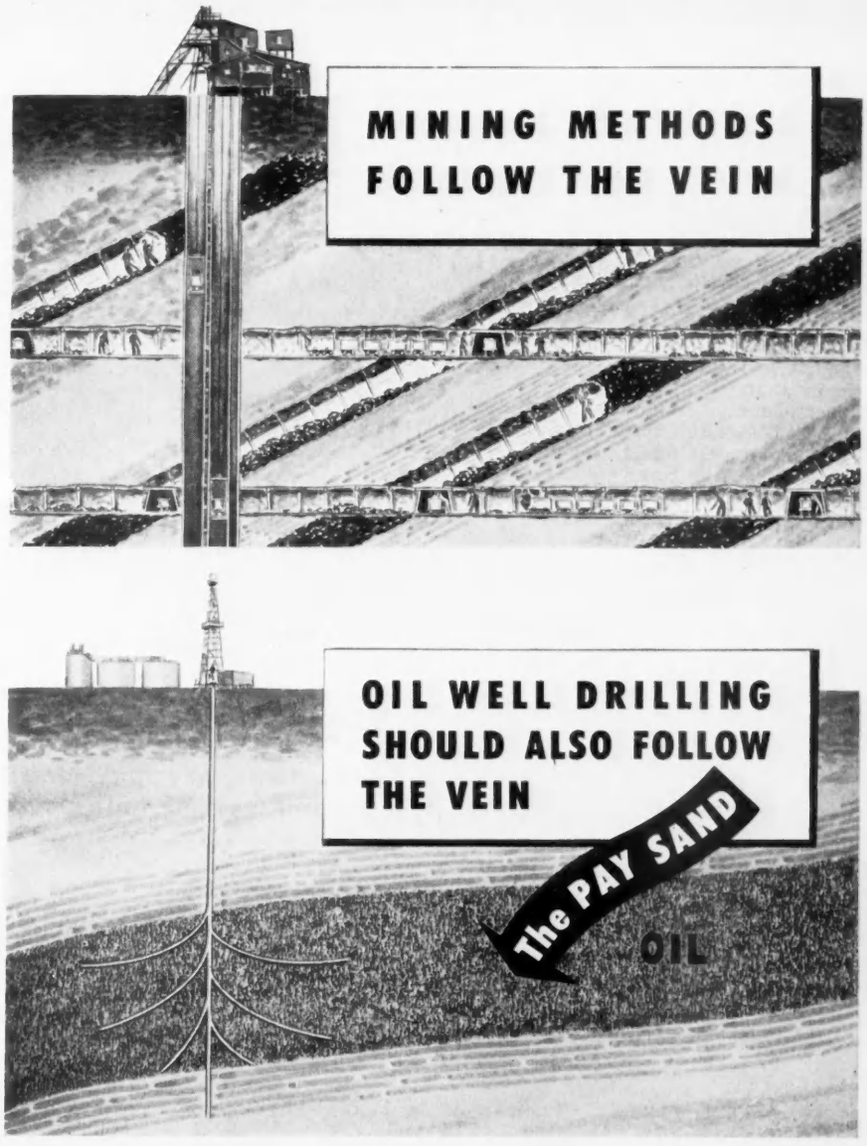

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gas and distillate producer after extensive tests and plugging. The well was drilled to 7386 feet and perforated at 7381-85 feet where it tested salt water. It was then plugged back to 5250 feet and perforated at 5093-96 feet where salt water was recovered on a test. The cement plug was drilled to the old total depth and again tested through the first set of perforations using a ¼-inch choke. The well flowed gas and distillate.

☆ Mississippi

Soso Field Being Developed; Sharkey Flank Tests Fail

Soso field in Jasper County being developed; two tests on flanks of Sharkey platform abandoned.

Jasper County: Gulf Refining Company's J. B. Ruffin 1, N&E SWc 27-10n-13w, northwest offset and first well to be drilled in the Soso field since the discovery, Edwards-Bailey 1, was brought in last year, is running core tests below 6500 feet. Eutaw was topped at 6239 feet and cores of the zone recovered shale with salt water. The potential gas productive zone of the field should be encountered within the next 200 feet. In the East Heidelberg field Richard B. Lack has completed Morrison 1, SEc SW SW 12-1n-12e, for a fair producer with an initial production of 35 barrels of oil per day although large input of salt water was noted on first tests. In West Heidelberg, Gulf is also preparing to complete McDonald-James Unit 1, 35-1n-12e, after swabbing oil at the rate of 24 barrels per day from the Eutaw zone below 5028 feet.

Forrest County: The Superior Oil Company's Cassie Bradford 1, SEc EW SW 1-3n-13w, is drilling below 13,000 feet with no shows officially announced. A depth record is being set by the well and there is some possibility it may go to 15,000 feet.

Lincoln County: Roeser & Pendleton's Columbus Lumber Company 1, NE NW 20-6n-6e, wildcat, is drilling below 10,700 feet with no shows. Cores from the Marine Tuscaloosa zone at 10,510-520 feet recovered sand and shale with no shows. Humble Oil & Refining Company's Lincoln County Board of Supervisors 1, NEc 16-8n-5e, is shut down temporarily at 105 feet while new rig is being erected. Test will go to 10,000 feet. In the Brookhaven field, Sun Oil Company's Leon Case 1, NEc 17-7n-7e, was drilling at 11,050 feet. The well has been extensively cored in the lower horizons but no shows have been recovered.

Sharkey Platform: Two of the 4 tests being drilled on the flanks of the Sharkey platform in the vicinity of the Mississippi River were abandoned. In Issaquena County Plymouth Oil Company's Anderson-Tully 1, NWc 13-9n-9w, was abandoned in sand at 5001 feet. The well was continually cored but no shows were encountered. In Warren County McAlester Fuel Company's Anderson-Tully Lumber Company 1, NE NE 35-18n-1e, was abandoned at 7008 feet in sand. No shows were encountered.

Adams County: The Ohio Oil Company's George W. Armstrong 1, SEc 12-5n-3w, wildcat, is running core tests of the Wilcox zone below 6200 feet. No shows have been noted. In Canfield field, Gulf's Ella G. Lees 6, NEc 71-7n-1w, is preparing to make a good producer after well flowed at the rate of 684 barrels per day through ¼-inch choke from the Massive sand zone. Tests continue.

Wayne County: L. P. Larue's Robinson Lumber Company 1, NE NW 20-6n-6w, Massive sand prospect, has been finally abandoned at 7825 feet. Neither the Eutaw, Tuscaloosa nor Massive sand zones yielded any shows. Larue's W. R. Barnhille 1, NW NW 21-8n-9w, was preparing to run core tests of the Eutaw horizon after topping the zone at 6024 feet. Humble's E. L. West 1, NE SE 18-9n-7w, is running core tests below 8521 feet after making electrical survey to that point. No shows have been encountered.

Yazoo County: Sohio Petroleum Company's J. Christopher-Texas Company 1, is drilling below 5200 feet after topping chalk at 5125 feet. The test will explore the Tuscaloosa below 6000 feet.

Mississippi Strike Ends

After several weeks' work stoppage which held up a majority of the state's 35 active locations, Mississippi rig builders have returned to work. Since ending the strike, a number of tests have become active with several more expecting to be spudded.

☆ Rocky Mountain Area

Carbon County, Wyoming, Test Has Show of Gas in Frontier

Carbon County, Wyoming, test has show of gas in Frontier; Natrona County well may be deepened; Stanolind to deepen Park County test to Madison; Washakie County test is failure in Tensleep; Rangely field, Colorado, has first pumper.

Wyoming

The Texas Company has had a show of gas in Frontier topped at 3161 feet at Mill Creek Unit 1, wildcat in NE NE SE 14-20n-81w, Carbon County. A drill-stem test at 3163-3202 feet, tester open an hour, recovered 150,000 cubic feet of gas and 80 feet of gas-cut mud. The well is below 3300 feet.

Natrona County: British American Oil Producing Company's test of the Castle Creek structure, 25 miles north of Casper, at Unit-Davis 1, SW NW NE 24-38n-81w, is making 3 to 4 bailers of fluid per hour, only 25 percent of which is oil. This test is of the Third Frontier formation topped at 2261 feet, with 5½-inch casing set at 2263 feet.

Park County: An important test will be Stanolind Oil & Gas Company deepening of Unit 38, NE SE NE 24-58n-100w, Elk Basin field, to the Madison. This field now has 128 wells producing from the Tensleep sand at around 4000 feet, making an average of 16,000 barrels daily for the field. Madison is expected at around 5000 feet in the Stanolind well.

Washakie County: The Pure Oil Company's Unit 2, NE NE NW 12-48n-92½w, at River Dome, is a failure in the Tensleep sand, 10,542-721 feet, and has been plugged back to 10,387 feet to test the Embar section, productive in the discovery well a mile southeast. On drill-stem test in the Tensleep, only 60 feet of drilling mud was recovered in 71 minutes. The well had several shows of oil and gas in upper sands and in the Tensleep at around 10,600 feet had considerable oil staining in cores, but porosity was reported poor. The discovery well at Unit 1 is still producing approximately 25 barrels of oil per day with 250,000 cubic feet of gas through choke.

Colorado

Stanolind's Coltharp 1, SW SE SW 35-2n-102w, Rio Blanco County, has extended the Rangely field ½ mile southeast by making 348 barrels of oil through 20/64-inch choke from Weber at 5624-6174 feet, total depth. Weber was at a datum of minus 417 feet and sand conditions were better than had been expected for that side of the field. Algord Oil Company's Guiberson 2, C NE NE 18-2n-102w, an extension well to the north, has finally been announced as a completion and is the first pumping well in the Rangely field. With Weber at 6410 feet, at a datum of minus 1082 feet, and total depth 6465 feet, the well pumped 281 barrels of oil in 24 hours.

Gulf Coast Map Issued

The Commercial Drafting Service, 1651 Colquitt Street, Houston, has announced the completion of a new oil and gas field map of the entire Gulf Coast, from the Mexican border to western Alabama. The map covers Texas Railroad Commission districts 1, 2, 3 and 4, South Louisiana, South Mississippi, and Western Alabama to Mobile.

There are over 1050 oil, gas and condensate fields shown on the map with their names, discovery dates, gravity of production, and the name and depth of the producing formation. Other data on the map include the size and ownership of oil and gas trunk pipe lines, and the refineries and natural gasoline plants with the same data.

☆ Michigan

Clare County Offset Has Gas-Saturated Formation

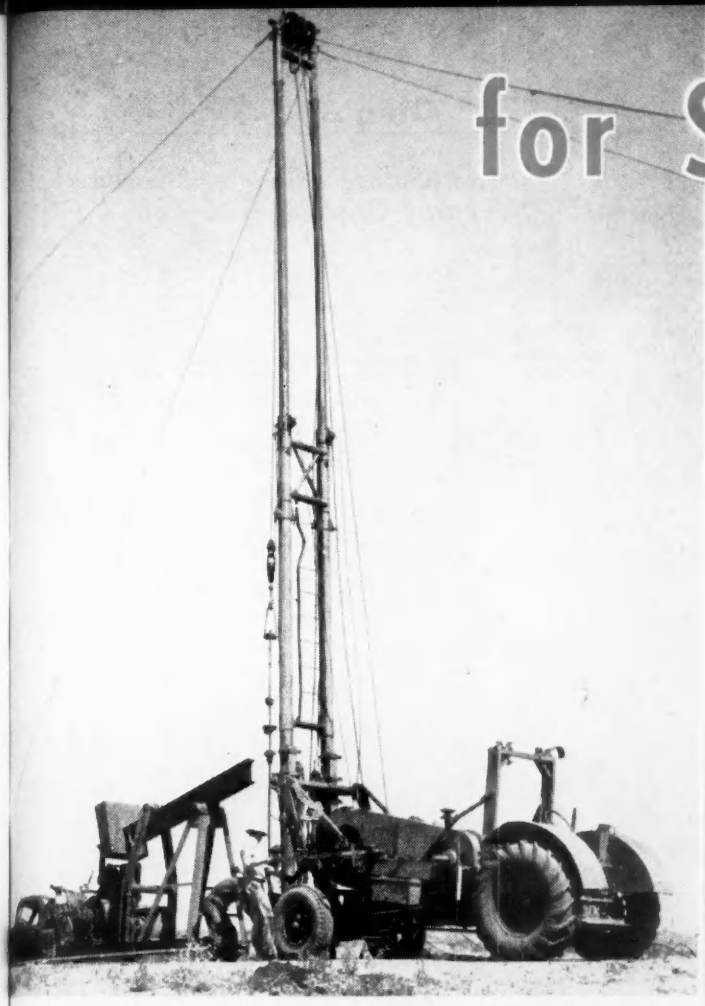
Clare County offset recovers gas-saturated formation; Hawkhead play slowed; tests delayed in Montcalm County project.

Clare County: The Pure Oil Company's Mulder 1, N½ SE SW 18-17n-6w, southeast diagonal offset to the same company's Freer 1, Richfield sand gas-distillate discovery, logged sand at 5077 feet, 25 to 30 feet lower than the Freer, and recovered 4 feet of hard but gas-saturated sand-dolomite formation at 5077-51 feet. Formation continued hard, mostly dolomite, to 5091 feet, where drilling was temporarily halted to make rig repairs.

Sohio Petroleum Company's Buxton 1, N½ SE SE 13-17n-7w, 1320 feet west of the Pure-Mulder, perforated with 100 shots between 5044-5060 feet and showed only a trace of gas. Perforated zone showed 810,000 cubic feet gas on drill-stem test before casing was set to 5112 feet.

Pure has halted drilling at 5020 feet on Zimmerman A-1, N½ NW SE 12-17n-7w, a mile north of the Freer discovery, to convert from cable tools to rotary. Richfield section will be cored.

Allegan County: The state's biggest oil drilling play of the year has slowed down with only 3 out of 14 tests drilled in the Hawkhead area rated as commercial wells. Five have been aban-



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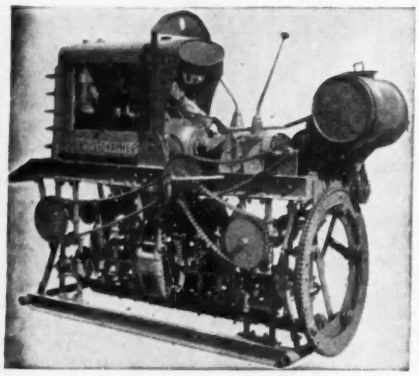

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doned as failures and the other 6 testing with the shallow Traverse lime pay between 1080 and 1125 feet showing a high volume of water with some oil.

Montcalm County: Failure to get water shutoff with packer run on tubing has delayed tests of an oil show logged on Montcalm Development Company's Pollard 1, NW NW NE 8-11n-5w, wildcat 5 miles northwest of the old Crystal field. Test logged Dundee at 3393 feet and at 3415 feet showed saturated dolomite zone. Water from upper formations prevented accurate test.

☆ Illinois Basin

Jasper and Gallatin Counties, Illinois, Get New Production

New production opened in Jasper, Gallatin counties, Illinois; Wayne County test is opening new area or extending Decker pool; Morgan County has new gas field; Gibson County, Indiana, has new pool with both oil and gas production.

Illinois

J. W. Menhall is opening a new pool with Eaton 1, NWC 13-6n-9e, Jasper County. On a 1-hour drill-stem test, the well showed gas and made 2000 feet of oil from Rosiclare break at 2940-45 feet. Operator has set pipe for production test.

Gallatin County: Wiser Oil Company's Mitsdorffer, NE SE NW 24-8s-8e, is a pool opener with production from McClosky lime at 2845-50 feet. The well made gas in 2 minutes and sprayed oil for the last 30 minutes during a 1-hour drill-stem test.

Wayne County: A. J. Slagter's Pierce 1, NE 22-2n-8e, northeast Zif Township, is opening a new area or extending the rich Decker Township pool of Richland County. The well was brought in flowing 600 barrels of oil daily, natural, and maintained the same flow several days before being placed on gauge for a production test.

Morgan County: L. M. Ladet's Stenemeyer 1, NW NW NE 22-13n-8w, has opened a new gas field. On initial test, the well yielded 1,700,000 cubic feet of gas in 24 hours from the Pennsylvania sand at 250-265 feet.

White County: The Superior Oil Company's Ford 27, NW SW NE 8-5s-14w, a mile west of the New Harmony field, was completed on pump for initial production of 400 barrels of oil in 24 hours. Production is from McClosky lime, which was given 2000 gallons of acid at 2935-65 feet.

Cumberland County: Initial production figures on National Associated Petroleum Company's Krogmann 1, NW NE SE 31-9s-7e, a discovery well, have been revised. The well initialed 140 barrels of oil in 24 hours on pump without acid. Initial production originally was reported as 117 barrels.

Indiana

Eldon Hayden's Crecelius 2, SW SW 5-2s-10w, Gibson County, is opening a new pool with both oil and gas production. In early tests the well made 100,000 cubic feet of gas from a McClosky lime break at 2050-51 feet, and flowed 50 barrels of oil in 24 hours from a break at 2775-80 feet.

☆ Ohio

Columbiana County Is Given Large Oriskany Gas Well

Large Oriskany gas well noted in Columbiana County; East Canton has Clinton gas well; third Cinnamon well in Newton; Injun gas found in Tuscarawas test.

Columbiana County: The Ohio Oil Company-C. A. Smith's T. M. Prescott 1, SW NW 14, Madison Township, logged Niagara lime at 4050 feet and Oriskany sand at 4311. At 4326 the well had a gauge of 6 million cubic feet of gas natural. This is the third well to be completed in the pool, and is 1 mile north of Powell 1 and ¼ mile west of Bennett 1.

Stark County: J. A. Upham's Canton Malleable Iron Company 1, SE NW 2, Canton Township, drilled white Clinton from 4650-72 feet with a natural gauge of 2 million cubic feet of gas. After a shot the well was shut in on casing at 7½ million.

Licking County: Ohio Fuel Gas Company's P. V. Denny 1, Newton Township, drilled through the Cinnamon, 1020-1300 feet, with a gauge of 130,000 cubic feet. After shot the well was shut in at 300,000 cubic feet.

Tuscarawas County: Bowman et al W. A. Hannah NW NW 22, Washington Township, unexpectedly struck 700,000 cubic feet of gas in the Injun sand while drilling a wildcat Oriskany test.

☆ Canada

Seven Companies Join Forces To Drill Princess Area Tests

Seven companies have joined forces for the drilling of 2 more seismograph "highs" in the general Princess area, southeast Alberta Plains, 100 miles east of Calgary. The program is being carried out by Princess-Brooks Syndicate, backed by Standard Oil Company of California, Pacific Petroleums, Princess Petroleums, Globe Oil, Calmont Oils, and the Regent and Can-Tex Drilling companies. Initial well, Princess-Brooks Syndicate-CPR 1, has been spudded in lsd 13 17-19-13w4th. Site is 9 miles west and a mile south of the Empire-Pacific 1 and 2, completed in 1945 as Madison lime oil wells on a seismograph high, and 13 miles west and 3 miles north of the South Princess Syndicate 2, now completing with indications of a Madison lime oil discovery on another seismic high.

Imperial Oil Ltd. and Shell Oil Company of Canada have completed drilling at their wildcat at Stolberg, Central Alberta Foothills, at 13,747 feet, greatest depth yet reached in Western Canada, and are now testing porosity in the 2 Madison limestone sections penetrated. The well, in lsd 3 22-41-14w5th, spudded March 30, 1945, ran into difficulties with caving formation, and set 7-inch casing at 10,931 feet to protect the hole. Drilling was then carried to reach the Madison lime at 12,218 feet, faulting back to Fernie at 12,477 feet, reentering lime at 12,826 feet, and winding up in the Banff lime below the Madison at 13,747 feet. Slight porosity showed in both Madison sections, but in view of depth and long section of open hole, no tests were made.

EXPLORATORY COMPLETIONS

ARKANSAS WILDCAT

Ouachita County—Failure: Raymond D. Reynolds' Robinson 1, se se se 36-14s-19w, Nacatoch 1360, Buckrange 2047, Tokio 2260, abnd 2653.

CALIFORNIA WILDCATS

Kern County—Failures: Signal Petroleum of Calif.'s, Di Giorgio 1, 1-31s-29e, Arvin area, Top Granite 1482, abnd 2031.

M. J. Stansbury & Associates' Tejon 1, 30-11n-19w, Grapevine-Tejon area, Santa Margarita 3130, abnd 3185.

Los Angeles County—Failures: C. G. Willis' Simons 1, 15-2s-12w, East Los Angeles area, abnd 9800.

Union Oil's Culp 1, 7-2s-11w, Pico area, abnd 5950.

Ventura County—Failure: Continental Oil's Casitas 2, 7-3n-23w, Red Mountain area, abnd 12,188.

COLORADO OUTPOST

Rio Blanco County—Rangely extension: Stanolind's Coltharp 1, sw se sw 35-2n-102w, 6174 TD, Weber 5621, El 5207 RB, flow 348 bbls oil thru 20/64 choke, 24 hours, extension ½ mile southeast.

FLORIDA WILDCATS

Franklin County—Failure: Pure's St. Joe Paper Co. 2, nwc ne 34-6s-4w, abnd 4787.

ILLINOIS WILDCATS

Bond County—Failure: Sohio's Mohne 1, nw se se 14-6n-5w, abnd 2668.

Coles County—Failure: F. D. Walker et al's Browne 1, nw se se 36-14n-7e, abnd 1900.

Effingham County—Failure: National Associated Pet. Co.'s Kohnert 1, ne nw se 18-7n-6e, abnd 2686.

Hamilton County—Failure: Claude Neon Lights, Inc.'s Wilson 1, ne se sw 30-6s-6e, abnd 3210.

Marion County—Failure: Sohio's Hawkins 1, se se new 29-1n-4e, abnd 2931.

Perry County—Failure: E. M. Self et al's Kirkpatrick 1, nw nw sw 30-4s-1w, abnd 1310.

Richland County—Failure: F. J. Fleming et al's Reed 1-A, sw se ne 27-3n-10w, abnd 3336.

Shelby County Oil Discovery: Sohio's Flenner 1, se ne nw 17-10n-4e, pump 12 bbls fr Benoit sd, 1774-81 ft; td, 1788.

Shelby County—Failures: Milo E. McKittrick's Lewis 1, ne se se 30-10n-4e, abnd 1916.

C. E. Hanes' Geisler 1, ne ne se 19-10n-5e, abnd 1964.

Wabash County — Failures: George & Wrather's Gilkinson Heirs 1, nw ne sw 36-1s-14w, abnd 3000.

Continental Oil's Stelzer 1, ne nw nw 36-1s-13w, abnd 2014.

Wayne County—Oil Discovery: K. & B. Drilling Co.'s Smith 1, w½ sw ne 21-1s-7e, pump 73 bbls fr Aux Vases sand, 1344-60 ft; td, 3323.

White County—Failure: Ralph Halbert's Mills 1, ne sw nw 35-6s-8e, abnd 3137.

INDIANA WILDCATS

Floyd County—Failure: Chenault & Render's Scarf 1, 28-1s-5e, abnd 2241.

Gibson County—Failure: Just Rite Drilling Co.'s Gudzell 1, nw nw nw 33-3s-11w, abnd 2608.

KANSAS WILDCATS

Barton County—Failure: C. E. Ash's Moses Estate 1, sw sw nw 35-17s-13w, abnd 3410.

Butler County—Oil Discovery: J. P. Gaty's Schwalter 1, ne nw sw 23-28s-3e, pump 40 bbls Simpson Sand, 3001-03 ft; td, 3003.

Cowley County—Failure: Earl Wakefield's Ogilbee 1, sw ne ne 7-32s-4e, abnd 1980.

Marion County—Failure: Joe Morine's Theis 1, sw sw sw 14-19s-1e, abnd 2386.

Rooks County—Failure: Cities Service's Milner 1, sw sw ne 17-8s-18w, abnd 3517.

KENTUCKY WILDCATS

Hopkins County—Failure: H. H. Weinert et al's Haywood 1, 24-L-25, abnd 3089.

Ohio County—Failure: Kingwood et al's Galey Minerals 1, 3-N-34, abnd 954.

NORTH LOUISIANA WILDCATS

Richland Parish—Failure: Pan-American Prod. Co.'s Geo. B. Franklin 2, 2300 fr sl 330 fr el 34-18n-8e, abnd 4002.

Tensas Parish—Failure: Chicago Mill & Lbr. Co.'s Mutual 2-A, 4620 fr nl 1972 fr el 30-12n-10e, abnd 8400.

SOUTH LOUISIANA WILDCATS

Cameron Parish—Failure: Texas' Lutcher-Moore Lbr. Co. 1, 661 s & 413 w sec sect 13 in sect 24-14s-12w, abnd 11,001.

Cameron Parish—Black Bayou New Pay: Shell's Watkins 64, 4490 & 795 n swc sect 8-12s-12w fl 253 bbls fr 7130-60, td 8000.

East Baton Rouge Parish—Failure: Union Prodng Co.'s E. L. East Est. 1, fr common cor sect 32, 51 & 52-4s-1w, E. Feliciana Parish, go s 58 deg 1 min 30 sec e 3523 to lcn, in extr nwc of Parish, abnd 11,235.

Evangeline Parish—Mamou New Pay: Magnolia's Deshotel 1, 660 s & e nwc of nw¼ ne¼ sect 7-5s-1e, fl 259 bbls fr 11,768-772, td 12,037.

Plaquemines Parish—Venice New Pay: Tide Water's Buras Levee Distr 32, 759 s 235 w nec sect 28-21s-30e, fl 260 bbls fr 11,775-805, td 12, 192.

St. Mary Parish—Failure: The Texas Co.'s State-Cote Blanche Island 10, s 29 deg e 5000 fr USC&GS "Bluff" in West Cote Blanche Bay, abnd 1864.

MICHIGAN WILDCATS

Allegan County—Failure: Fisher-McCall's Morganstern 1, se sw nw 22-3n-11w, abnd 1880.

Arenac County—Failure: Frank R. Roush's Schreiber 1, ne nw sw 18-18n-5e, abnd 2960.

Bay County—Failure: Fletcher and Leman's Maxson 1, nw ne ne 12-16n-3e, abnd 3104.

Livingston County—Failure: Bridgeport Oil's Wilson 1, nw ne nw 17-3n-4e, abnd 1290.

Mecosta County—Failure: Maguire et al's Smith 1, ne nw nw 22-14n-8w, abnd 3692.

Wexford County—Failure: Wright and Keeler's Wilcox 1, ne ne se 32-23n-9w, abnd 4011.

MISSISSIPPI WILDCATS

Issaquena County—Failure: Plymouth Oil Co.'s Anderson-Tully 1, nwc 13-9n-9w, Wilcox 1950, Gas Rock 3533, Paluxy 3552, abnd 5001.

Warren County—Failure: McAlester Fuel's Anderson-Tully Lbr. Co. 1, ne ne 35-18n-1e, Wilcox 2363, Gas Rock 4164, Tuscaloosa 4179, Massive sd 4795, Mass-anhy 6530, abnd 7008.

NEW MEXICO WILDCAT

Lea County—Failure: Repollo's Simmons 1, c sw se 25-21s-37e, elev 3390 ft, anhydrite 1330, base salt 2580, Yates 2760, Glorietta 5395, base Permian 7735, Devonian 7805, Silurian 8430, abnd 8767.

OHIO WILDCAT

Ashland County—Failure: Ohio Fuel's Jesse Workman 1, sw sw 19, Lake Township, Clinton 2838-43, td, 2887.

OKLAHOMA WILDCATS

Carter County—Failure: W. F. Turner's Woerz 1, ne nw sw 7-5s-1e, abnd 5234.

Comanche County—Failure: G. C. English's Coldren 1, sw ne nw 15-1s-13w, abnd 2709.

Cotton County—Failure: E. W. Whitaker's Graham 1, sw se se 5-4s-11w, abnd 1935.

Lincoln County—Oil Discovery: Hubble & Webb's Glen Smith 1, se ne se 3-14n-6e, pump 6 bbls Hunton lime, 4042-55, td 4075.

Lincoln County—Failure: Four States Oil Co.'s James 1, nw nw se 1-12n-5e, abnd 4712.

McClain County—Oil Discovery: Big Chief Drlg's Stephens 1, cse sw 2405n-2w, flow 236 bbls second Bromide, 6561-71, td 7977.

Seminole County—Failure: Mid-Continent Pet.'s Markwell 1, sw nw se 28-9n-7e, abnd 3687.

Tillman County—Failure: S. D. Johnson et al's Lundy 1, 4-3s-19w, abnd 5592.

WEST TEXAS WILDCATS

Crane County—Failures: Humble's G. H. Cowden 2, c sw ne CCSD&RGNG Co. 20, blk X, elev 2576, Devonian 7575, Ellenburger 9927, abnd 10,125.

Humble's Cowden 1-B, c sw sw CCSD & RGNG Co. 14, blk X, elev 2560, anhydrite 820, Yates 1840, San Andres 2890, San Angelo 3840, Clear Fork 4400, Devonian 7874, Silurian 8730, Montoya 8845, Simpson 8995, Ellenburger 9930, abnd 10,072.

Jeff Davis County—Failure: H. D. Cornell et al's Cornell 1, 2639 ft snl and 660 ewl T&P Ry. 24, blk 60, Tsp. 9, elev 4831, Upper Cretaceous 208, Buda 1268, Trinity sand 1780, abnd 1946.

Ector County—Failure: N. R. Brasted-Hyer & Hal Hedberg's Henderson-Humble 1, c sw sw T&P Ry. 6, blk 43, T-3-S, elev 3074, anhydrite 1700, San Andres 4335, San Angelo 5565, abnd 5720.

Lamb County—Failure: Humble's Branton 1, c sw se sec 18, blk 1, E. M. Thomason sur, elev 3432, abnd 6685.

Winkler County—Sealy-Smith Field Oil Discovery: Stanolind's Sealy-Smith Foundation 8, 1986 ft snl and 660 ewl G&MMB&A Co. 48, blk A, 1¼ mi s by e of North Monahans 6100-ft Holt field and lower structurally, elev 2747, San Angelo (Holt) 5070, flowed 421 bbls 35.4-gr oil, gor 1216/1, via ¼-in choke, acidized 2000 gals open hole pay 5115-5215.

Garza County—Failure: Paul G. Schaefer and H. T. Brady's Everett 1, sw sw se H&GN Ry. 14, blk 2, elev 2292, anhydrite 380, San Andres 1650, Glorietta 2700, abnd 3517.

WEST TEXAS WILDCATS

Crockett County: B. F. Phillips et al's Shannon 1, 2340 ft snl 250 ft ewl GC&SF Ry. 7, blk Q, elev 2816, anhydrite 1040, salt 1110-1488, Yates 1567, Grayburg 2562, San Andres 2675, abnd 2695.

Hockley County—Failure: Honolulu Oil's Burson-Conoco 1, 440 ft wel and 2200 ft snl sec 8, blk A, R. M. Thomson sur, elev 3354, Anhydrite 1970, brown lime 3470, San Andres 3740, Glorietta 5200, abnd 6978.

WEST TEXAS OUTPOSTS

Crane County—Sand Hills Field Outpost Failure: Ray Oil Co.-M. Staniforth's Connell 1, c se se PSL 8, blk B-26, elev 2700, 1¼ mi n of nearest production, abnd 5125.

Andrews County—Emma Field Outpost Failure: Texas Gulf Producing's University-Cities Service 1, lse 4, c se se sec 30, blk 9, mile ne of production, anhydrite 1810, San Andres 4350, abnd 4505.

Upton County—Crane-Cowden Field Outpost Failure: Elder & Russell's Fee 1, ne sw ne sec 94, blk Y, F. Rooney sur, 1 mi ne of production, elev 2672, abnd 2805.

WEST CENTRAL TEXAS WILDCATS

Eastland County—Oil Discovery: J. D. Sandifer Jr.'s G. P. Brawner 2, 150 ft nsl and 550 ft wel of sw ne E. T. Ry. 25, blk 2, pumped 28 bbls 38-gr from Strawn sand 1058-61.

Jones County—Failure: Ted Weiner and Pan American Production's Gray 1, se sw nw sec 25, Deaf & Dumb Asylum Lands, elev 1570 ft, abnd 2178.

Taylor County—Failure: Hedrick Oil Co.'s Teaff 2, 330 ft out nwc labor 14, lge 124, Grimes CSL, elev 1869, abnd 2810.

McCulloch County—Failure: G. A. Gage et al's Scroggins 1, 330 ft out swc of John Henk sur 911, elev 1575, Ellenburger 723, abnd in granite 1280.

NORTH TEXAS WILDCATS

Archer County—Oil Discoveries: Harvey Drlg et al's C. L. Abercrombie 1-A, 750 ft nsl and 1500 ft wel F. M. Taber sur, A-723, pumped 10 bbls 40.3-gr shot 12 sticks of dynamite in Cisco sand 1272-79.

Clyde Gibson et al's L. F. Wilson-McCrory 2-A, 330 ft nsl and 280 ft ewl lot 1, sec 55, ATNCL sur, elev 1023, pumped 50 bbls Cisco sand 1461-67.

Archer County—Failures: K. R. March et al's Stallcup 1, 150 ft out sec n½ sec 33, blk 5, Clark & Plumb sur, abnd 1210.

Texola Drlg Co. and J. W. Sorrells' Jos. Pace 1, 625 ft from m/n/n and 330 from m/n/e lines C. K. Simmons sur A-391, elev 1019, Bend 4844, abnd 5200.

Cooke County—Failure: Hollandsworth Drlg. Co. & Sam Seigel's N. F. Alexander 1, 330 ft ewl and 30 snl of 87-ac (122-ac) tr, Harriett Nail sur, A-790, abnd 1464.

Throckmorton County—Failure: Paul P. Steed et al's Mathews 1, ne sw nw E. T. Ry. Co. 224, blk 10, abnd 1385.

Wilbarger County—Failures: A. E. Blair et al's Holt 1, 2490 ft nsl and 1170 ft ewl H&TC Ry. 26, blk 13, elev 1205, abnd 2100.

Standard of Ohio-G. E. Kadane & Sons' Showers 1, 1320 ft snl and 2529 wel H&TC Ry. 23, blk 13, elev 1248, Canyon 2991, abnd 5250.

Young County—Oil Discovery: Nu-Enamel Oil Operating Co.'s Donnell-Shell 1, 467 ft out nwc TE&L Co. 1205, elev 1132, Bend 3353, pumped 31 bbls oil and 4 bbls water from sand 1759-80, shot 35 qts nitro 1766-80, td 3402, pb to 1785.

Young County—New Pay Discovery for Old Area: Hassie Hunt, trustee's Harrison 1, 2196 ft out swc F. Jaomes sur A-157, elev 1146, Palo Pinto 1420, pumped 20 bbls oil, plus 3% water, shot 40 qts nitro 2692-66.

NORTH TEXAS NEW PAY DISCOVERY

Cooke County—Almon Field Deep Pay Discovery: Fred Snuggs-McElreath-Neal Bros. & Kingery's Almon-Sun 7, 500 ft snl and 300 ewl of James Randolph sur, elev 802, pumped 120 bbls 25-gr initial from Strawn open hole 3934-42.

EAST TEXAS WILDCATS

Bowie County—Junked: Delta Drlg Co. et al's Gauntt 1, 335 ft snl and 919 fr m/e/e line of 71-ac tr, James Giles sur, elev 324, Woodbine 3140, Georgetown 3330, sur pipe unseated, jkd at 3716, skid rig and spd new test.

McLennan County—Failure: John C. Rogers et al's Warren 1, 1200 ft fr sw and 1600 fr se lines M. Martinez sur, elev 545, Glen Rose 742, top massive anhydrite 820, abnd 980.

Wood County—Failure: Bobby Manziel et al's Judy Brown 1, 330 ft out sec of 40-ac lse, or 2700 sw of m/s/n and 2700 w of Sabine River, Henry W. Augustine (south) sur, elev 300, Georgetown 3970, abnd 4175.

EAST TEXAS BORDER WILDCATS

Angelina County: Correction—Tex-Mo Drlg. Co.'s Long Bell Pet. Co. 1, abnd 5028 and not 3001 as previously reported.

Bowie County—Failure: Delta Drlg. Co.'s

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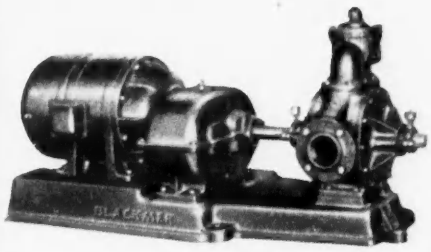

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Trading Post Section, The Oil Weekly
P. O. Box 2608 Houston 1, Texas

Gauntt 1, 1320 s & 1720 e nwc James Giles sur, 2½ mi w Simms, abnd 3716.

Harrison County—Oil Discovery: E. C. Johnston's Cargill 1, 2500 s 70 w 20 e fr nec Simpson Holloway sur, 16 mi e Marshall, fl 527 bbls fr 5931-44, td 5944.

SOUTH CENTRAL TEXAS WILDCATS

Frio County—Failure: Geo. W. Strake-Warren Pet. Corp.-Wiegand Bros. Drlg. Co.'s Grace Cowden Henry 2, 467 w of el 4600 s fr n cor 3548-ac lse, A. Petra de la Pena sur 153, lower than Well 1, abnd in Edwards li 3685.

Guadalupe County—Failure: Frank J. Gravis' Weyel 1, 990 fr sl 990 fr nel 344-ac lse, E. de Los Santos Coy sur, Talo Schrift 2575, abnd 2586.

SOUTHWEST TEXAS WILDCATS

Duval County—Failures: John F. Camp's J. M. Bennett 1, 467 fr el 1400 fr sl 640-ac lse, 3415 fr nl 467 fr el CEPI&M Co. sur 40, abnd 3999.

H. R. Smith-Skinner & Eddy Corp.'s John F. Sinclair et al 1, 467 fr n&el 80-ac lse, S.F. 14267 sect 4 and S.F. 14263 sect 3, abnd 4002.

McMullen County—Oil Discovery: Dee Davenport's Annie Graves Delph et al 6-A, 330 fr n&wl se¼ se¼ sect 65, Shumway sbdn Shiner Reh 4200-ac lse, L. Musquiz sur 12, 8 mi sw Ezzell fld, open hole perf 1379-90, pump 5 bbls, td 1390.

Webb County—Oil Discovery: Killam-Hurd's J. G. Garcia Heirs 1, 795 fr nl 928 fr wl blk 47 Hughes Pet. Co. sbdn Los Ojuelos gr, sur 592, 160-ac lse, 1 mi e Mirando City fld, pay 1870, perf 16 shots 1872-74½, pump 108.9 bbls 21-gr, 25% wtr, gor 50/1, td 1926.

LOWER TEXAS COAST WILDCATS

Bee County—Failure: W. C. McBride's Gus Schultz 1, 800 fr sel 1100 fr swl 169.38-ac lse, Todoro Molina gr, abnd 3488.

Gonzales County—Failure: Southern Minerals Corp.-Santa Clara Oil Co.'s Octavia Vernor 1, 467 fr ne&sel 100-ac lse 870 s of nl Daniel McCoy sur, abnd 4932.

Nueces County—Distillate Discovery: H. R. Smith-W. C. McBride's E. G. Whitten 1, (OWDD) 660 fr sl 660 fr el 160-ac lse, sw¼ sect 153, F. Z. Bishop sbdn Weil Reh, 3 mi e Stratton fld, perf 24 shots 7038-46, flow dist, no gge, 30 mln gas, open, otd 7506, td 7878.

UPPER TEXAS COAST WILDCATS

Ft. Bend Country—Failures: Jack Frazier & Cecil Hagen's Chernosky & Kovar 1, 760 fr nwl 360 fr nel, 20 ac farmount lse nw cor sect 17, B. Wickson sur A-95, abnd 6745.

W. J. Goldston & Kenneth Owen's Leus 1, 330 fr sel 660 fr swl, 113 ac lse, D. W. Anthony sur A-437, sw Needville prodn, abnd 6807.

Matagorda County—Failure: Southwestern O & R Co.'s Kountze 1, 660 n & e swc ne/4 se/4, 610.47 ac lse, I&GN sur sec 20, 3½ mi w Markham fld, abnd 8795.

Polk County—Failure: Wynn Crosby Drlg. Co.'s Duke 1, 660 n & w sec 16 ac lse, P. J. Menard sur A-50, 3½ mi wsw Schwab (Ace) fld, abnd 8750.

CANADA WILDCAT

Central Alberta Plains—Fribourg Failure: Shell's Fribourg 31-32-54-9, lsd 14 32-54-9w4th, abnd 3657, completed in Devonian, water showing.

WILDCAT STARTS

ARKANSAS

Columbia County: Atlas O&R Co.'s R. A. Wynn 1, sw sw 8-16s-19w, 2 mi s shallow Stephens fld prod, Smackover or 5000-ft test.

Desha County: Lion Oil Co.'s Bickman 1, nw sw 35-10s-3w, mln for 4800-ft test.

Lafayette County: McAlester Fuel Co.'s Adams Est. 1-A, sw nw 16-16s-24w, 3 miles fr Spirit Lake discovery, 4500-ft test.

Nevada County: Spartan Drlg. Co.'s J. W. Plumbley 1, sw se ne 9-15s-22w, Falcon area, woc 210.

Ouachita County: Jack Karnes et al's Myar Bros. 2, sw sw se 14-13s-19w, 9 mi sw Troy fld, lcn.

CALIFORNIA

Kern County: Bender Oil's Claire 3, 22-28s-28e, Kern Front area, grade.

Butte County: General Pet.'s Llana Sect 1, 33-20n-1w, Willows area, cellar.

Yolo County: Shell Inc.'s Unit 1-1, 19-8n-1e, Winters area, ru.

Fresno County: Superior's K.C.D. 1, 13-17s-16e, Turk Anticline area, grade.

Orange County: A. W. Lyddon, Operator's Lamb Community 2, 6-6s-10w, Huntington Beach area, lcn.

Tide Water's Norris 2, 8-6s-10w, Fairview area, grading roads.

Ventura County: Honolulu Oil-Signal Oil's Bates 1, 36-4n-25w, Rincon area, lcn.

San Luis Obispo County: Mutual Oil Dev. Assn.'s 1, 3-26s-12e, Paso Robles area, lcn.

FLORIDA

Flagler County: Humble's Lake Crescent Farm Co. 1, nw ne 8-11s-28e, lcn.

ILLINOIS

Clay County: Collins Brothers' Baker 1, ne ne se 36-10n-14w, lcn.

W. L. Lichlyter's Coggan Heirs 1, ne nw se 19-4n-8e, lcn.

Clinton County: Harry E. Miller's Fee 1, 12-1n-5w, lcn.

T. Blake Dirickson's Brinkman 1, sw se se 20-1n-2w, lcn.

H. Luttrell et al's Corder 1, ne nw ne 21-1n-2w, drlg.

Coles County: Tex Harvey Oil Co.'s Bariether 1, se sw nw 35-13n-7e, lcn.

Cumberland County: National Associated Pet.'s Handly 1, sw se se 26-10n-7e, drlg.

Anthony V. Stephens' Hoffman 1, nw ne nw 34-11n-7e, drlg.

Effingham County: Inland Oil's White 1, sw sw ne 23-7n-5e, lcn.

Inland Oil's Pendlay 1, nw nw se 33-8n-5e, lcn.

National Associated Pet.'s Liberty School 1, se se nw 21-9n-4e, drlg.

Fayette County: Bell Bros.' Hoiste 1, sw se nw 12-5n-4e, lcn.

Shulman Bros.' Willms 1, se ne nw 6-6n-2e, drlg.

Gallatin County: Texas' McGehee 1, sw sw ne 29-9s-9e, lcn.

Robinson & Pickett's Owens 1, se ne nw 36-7s-9e, lcn.

Oil Management's Davis 1, sw sw ne 20-7s-10e, lcn.

Greene County: Clark-Crawford Syndicate's Davison 1, ne ne sw 9-9n-12w, lcn.

nw nw nw 13-6n-9e, lcn.

Jasper County: J. W. Menhall's Eaton 1, C. R. Craft's Ritz 1, se nw ne 25-6n-10e, lcn.

Lawrence County: Pete Suphtin's Preston 1, nw se nw 6-2n-12w, drlg.

Macon County: C. G. Davis' Boyd 1, ne ne se 29-17n-3e, lcn.

Marion County: E. J. Ruwaldt's Ward 1, sw sw se 25-1n-2e, lcn.

Continental Oil's Harmon 1, sw nw se 21-1n-4e, lcn.

Morgan County: L. M. Ladet's McNahan 1, 22-13n-8w, lcn.

Richland County: George S. Engle's Wynn 1, nw sw ne 30-2n-10e, drlg.

Hageman & Ponds' Coen 1, ne se se 22-3n-11w, drlg.

Shelby County: W. R. Britton's Durst 1, nw ne nw 27-11n-4e, lcn.

Washington County: Howard E. Walton's Helms 1, ne se ne 26-2s-4w, lcn.

Wayne County: Nash Redwine's Spriggs 1, se ne ne 22-1s-7e, drlg.

White County: Joe Hobbs' Williams 1, sw nw se 28-3s-10e, lcn.

INDIANA

Gibson County: Brinkerhoff Drlg's Mason 1, nw nw sw 16-3s-11w, lcn.

KANSAS

Jefferson County: Una Oil's Griffits 1, nw nw nw 2-10s-17e, rum.

Rooks County: Doley Oil's Henderson 1, sw sw nw 23-10s-19w, lcn.

Rush County: Sohio Oil et al's Schneider 1, sw sw nw 9-16s-18w, drlg.

KENTUCKY

Daviess County: F. E. Moran's Pemberton 1, 5-0-29, drlg.

J. C. Ellis et al's Shipp Heirs 2, 9-P-28, lcn.

Henderson County: Carter's Conley 1, 10-0-22, lcn.

NORTH LOUISIANA

Catahoula Parish: Lyons & Prentiss-Penrod Drlg. Co.'s P. L. Mitchell 1, c nw nw 36-8n-7e, 9800-ft test.

Tensas Parish: Joe W. Brown's B. W. Butler 1, 660 n 1279 w of sec 32-10n-10e, 1½ mi n of Lake St. John prod, L. Cretaceous test.

MISSISSIPPI

Lamar County: Humble's J. F. Fowler 1, nw ne 27-2n-14w, lcn.

SOUTH LOUISIANA

Tangipahoa Parish: Lion Chemical's Varnado 1, 660 e & 660 n of swc sect 38-2s-8e, Tuscaloosa sd test, lcn.

Terrebonne Parish: Superior's LL&E Co. 1, 849 s & 2555 e of nwc sect 24-21s-16e, se side of Four Isle Dome, 7000-ft test, lcn.

Vermilion Parish: Humble's A. R. Romaine et al 1, fr nec sect 25-12s-1e, go s'ly alg el 1991.8, th w'ly parallel to nl 660 to lcn, 12,000-ft test.

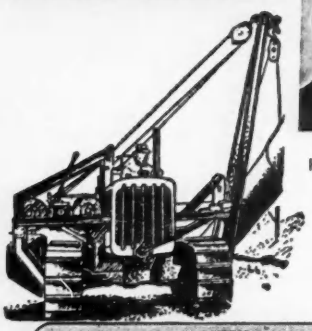
Stanolind's Watkins 1, fr nec sect 23-13s-1w go s & w 660 to lcn, 6 mi e Florence townsite, 12,000-ft test, lcn.

MICHIGAN

Arenac County: Basin Oil's Lehan 1, nw se ne 35-20n-5e, rig.

PIPELINE "Know-how"

F. A. (Arnold) Smith
Partner



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Lake County: C. W. Collin's Pomorski 1, sw se se 14-18n-12w, drlg.

MONTANA

Park County: Richfield Oil of Montana Wiese 1, se se sw 20-2s-11e, Mission Creek, OWDD OTD 1250, drlg 2060.

NEBRASKA

Banner County: Banner Oil, Limited's Lovercheck 1, c se se 22-19n-57w, mim.

OHIO

Meigs County: W. I. Gettman's C. S. Peoples 1, se sw 17, Lebanon Township, drlg.

OKLAHOMA

Beckham County: Shell's Walters 1, ne sw 14-10n-21w, lcn.

Caddo County: Nail-Reed Oil's Coyle 1, sw sw sw 27-5n-12w, c & p.

Cotton County: Sullivan Brothers' Graham 1, sw sw sw 32-3s-10w, lcn.

Bridewell's School Land 1, se se se 36-3s-11w, pits.

J. Ben Russell's Compton 1, sw sw sw 2-4s-10w, drlg.

L. H. Coate's Shelly 1, nw nw se 5-4s-10w, lcn.

Dewey County: Magnolia's Winter 1, csw ne 9-19n-20w, c & p.

Garfield County: Cities Service et al's Schultz 1, se se nw 7-24n-8w lcn.

Garvin County: R. H. Dearing & Son's Rogers Estate 1, ne nw se 32-4n-2w, lcn.

Kay County: Texas Co.'s Kahle 1, ne sw sw 18-28n-2e, lcn.

Logan County: Sun et al's Donehue 1, sw sw ne 11-19n-3w, rur.

Seminole County: Big Chief's Stockton 1, se sw ne 1-6n-5e, woc.

H. B. Pate's Phillips 1, se ne ne 8-9n-6e, cellar.

WEST TEXAS

Andrews County: Mid-Continent Pet. Corp's A. T. Culberson 1, c sw nw PSL 10, blk A-47, lcn 9350-ft Devonian test.

Globe O&R Co.'s Lockhart-Brown 1, c ne ne PSL 20, blk A-41, twin to San Andres failure, lcn for 7350-ft Clear Fork test.

Cooke County: Sun's Jameson 1, c se sw H&TC Ry. 253, blk 1-A, lcn for 7000-ft Ellenburger test.

Dawson County: Ray A. Albaugh et al's W. C. Orson 1, c se sw T&P Ry. 15, blk 33, T-5-N, lcn 5000-ft test.

Hockley County: H. L. Brown and Ridley Wheeler's R. O. Hammill 1, 660 ft out swc labor 25, lge 719, State Capitol Lands, lcn 5000-ft San Andres test.

Howard County: Santa Fe Pet. Co.'s Christian-Phillips Pet. 1, c se sw T&P Ry. 48, blk 32, T-2-N, lcn 4500-ft San Andres test.

Winkler County: Santa Fe Pet. Co.'s R. A. Wheeler-Magnolia 1, c nw nw PSL 21, blk B-6, lcn 10,500-ft Ellenburger test.

Dunigan Bros. & F. T. Brahaney's Sealy-Smith-Stanolind 1, c ne ne sec 86, blk A, G&MMB&A sur, lcn 6500-ft Clear Fork test.

WEST CENTRAL TEXAS

Jones County: Geochemical Surveys, Inc. et al's W. R. Cranston 1, 2700 ft snl and 1300 ewl T&P Ry. 11, blk 17, 4500 Palo Pinto test, sp.

McCulloch County: Mid-Tex Oil Co., Inc.'s W. H. Jones 1, 990 ft nsl and 3840 wel sec 939, lcn 1250-ft cable test.

Runnels County: W. R. Ransome et al's J. W. Davis 1-A, 695 snl and 2230 wel of 184-ac tract, J. V. Cabrera sur 514, lcn 6000-ft Ellenburger test.

Shackelford County: E. E. Fogelson and M. S. Ingleright's Lones 1, c se nw T&P Ry. 64, blk 11, lcn 4300-ft cable test.

R. H. Roark-Hooker-S. B. Roberts & Jones & Stasney's Lynch 1, 730 snl and 670 ewl sec 9, Blind Asylum Lands sur, lcn 4500-ft rotary Ellenburger test.

Taylor County: Carl Hovard et al's John Meeks 1, 330 ewl and 2100 nsl T&P Ry. 63, blk 19, lcn 3300-ft cable test.

West Central Drlg Co. et al's W. L. Kincaid 1, nw nw nw T&P Ry. 27, blk 16, 3¼ mi se Reddin field, testing at 2710.

NORTH TEXAS

Archer County: Trumter Pet. Corp's C. E. Ream 1, 200 snl and 600 ewl of 160-ac tr and blk 103, J. W. Harris subdiv., lcn 1700-ft rotary test.

Cooke County: Burk Royalty Co.'s F. B. Boudousky (was Whaley) 1, 330 s and 990 e of sec of S. D. Brown sur A-95, but in A. C. C. Bailey sur A-44, lcn for 2500-ft rotary test.

EAST TEXAS

Navarro County: Coffield & Guthrie, Inc.'s A. P. Mays 1, 1250 snl and 330 fr sw lines of 132-ac lse, or 330 fr sw and 2400 fr nw lines of John McNeal sur, 3 mi sw Angus, lcn.

Austin E. Stewart and H. G. Lewis' R. L. Hodge 1, 330 fr sw and 660 fr nw lines of 123.89-ac lse, or 660 fr nw and 1600 fr ne lines of Alfred Eaton sur, mile n Angus, lcn.

EAST TEXAS BORDER COUNTIES

Bowie County: Delta Drlg. Co.'s Southern Pine 1, 1331 s & 1639 e nwc James Giles sur, 2½ mi w Simms, lcn.

SOUTH CENTRAL TEXAS

Zavalla County: Texas Co.'s Cross S. Ranch 1, 990 fr n&wl 1010-ac lse, sect 53, blk 10, Pedro Jose de Aguirre gr, lcn.

Williamson County: H. G. Albert et al's No. 1, 1764 fr nl 870 fr el 128-ac lse, Peter Cartwright sur, lcn.

SOUTHWEST TEXAS

Duval County: Joe C. Palmer's Jas. F. Welder Heirs 1, 330 fr wl 3630 fr nl 480-ac lse, Samuel Alexander sur 102, 1 mi w Seven Sisters fld, 3100-ft test.

Star County: Sunray Oil Co.'s J. H. Clopton 1, c lot 23, B&B Oil Co. sbdn, blk 2, Porc 87, ru 33-ft test.

LOWER TEXAS COAST

Bee County: Magnolia's Moore-Turner 1, 1320 fr nwl 2800 fr nely/nel 544-ac unit, 1900 fr sely/sel 2800 fr nely/nel Geo. Pagan sur, 9000 s sw Burnell-Wilcox prod. 7200-ft test.

Stanolind's Nelson Lytle, Jr. 1, 660 fr swl 1980 fr nwl 494-ac lse, J. S. Maley, J. B. New and D. Cryer sur, 2½ mi n Theis fld, 8500-ft Wilcox test.

Henshaw Bros.' C. A. Barber 1, 467 fr se&swl ne¼ 103.65-ac lse, 467 ne of sel John Kelly sur, ½ mi Blanconia gas prod, 5500-ft test.

Brooks County: L. M. Lockhart et al's L. G. Denman 1, 330 fr sl 939-ac lse, 5206 e of wl Las Megueyes de Palo Blanco gr, Palo Blanco area, woc 839.

L. M. Lockhart et al's Kathleen J. Hocker 1, 466 fr nec Standard of Tex. lse, 4468.7 e of wl Las Megueyes de Palo Blanco gr, on 830-ac lse, Palo Blanco area, lcn.

Magnolia's N. Falfurrias Unit 1, 660 fr n, e&wl lot 4, blk 5, Falfurrias Farm & Garden tr, ½ mi nw Falfurrias on 375.15-ac unit, 2/3 mi s of s flk oil prod at La Gloria, 8300-ft test.

Goliad County: Magnolia's Wilkinson Est. 2, 1980 fr sel&el 1750.7-ac lse, Wm. P. Miller sur, dk for 10,500-ft test.

Hidalgo County: T. F. Murchison's C. O. Maddox 1, 330 w of el Porc 46, 460 e of Rio Grande River on 500-ac lse, 6000-ft test.

Kenedy County: Atlantic's H. F. McGill et al 1, 607 fr nl 12,843 fr wl Kenedy County, 39,200-ac lse, Sta. Rosa de Arriba gr, 10,500-ft test.

Willacy County: Magnolia-J. S. Abercrombie Co.'s Yturria Cattle Co. 1, 2571 s alg el Las Mestenas gr fr nec sect 47 Reynolds sbdn, th 2900 e at ra to lcn on 4534.78-ac lse, in lot 56 Cockburn-Hargrove sbdn of San Juan de Carricitos gr, 10,500 ft test.

UPPER TEXAS COAST

Chambers County: Sun's Hebert & Broussard 1, 667 fr el 467 fr sl 320-ac lse, HT&B sur 113, Willow Slough area, 8600-ft test, moving in drk.

Wharton County: Hornberger & Ferguson's Carlson 1, 330 fr sl 467 fr wl 160-ac tr W. D. Ivey sur 44 A-514, just w Withers field prodn, 7500-ft test, mim.

WYOMING

Park County: Stanolind's unit 38, ne se ne 24-58n-100w, Elk Basin, Madison test, OWDD OTD 4136, rur.

CANADA

South Alberta Plains—Pinhorn: McColl-Frontenac & Union of Calif.'s 4B-20-3-8, lsd 4 20-3-8w4th, drlg.

Central Alberta Plains—Elk Point: Anglo Canadian Oil, Home Oil & C. & E. Corp.'s Elk Point No. 2, lsd 3 14-57-6w4th; drlg.

McColl-Frontenac & Union of California's 7C-6-4-8, NW lsd 7 6-4-8w4th, loc.

Princess: Princess-Brooks Syndicate-CPR No. 1, lsd 13 17-19-13w4th, co-ords. 329.73 ft s 330 ft e; drlg.

Split Mountain, Utah, Formation Shown in Study

The U. S. Geological Survey has published a description and graphic section of the rock strata of the Morgan formation at Split Mountain, Utah, copies of which can be obtained without charge from the Survey office in Washington.

The rocks described underlie the highly productive Weber sandstone of Pennsylvanian age in the Rangely field and elsewhere in northeastern Colorado and northwestern Utah, and are themselves potential oil reservoirs, it was explained. A detailed description of the sequence of rocks between the Weber sandstone and the Madison limestone of Mississippian age, and a brief discussion of its age and correlation has been issued in mimeographed form, accompanied by a graphic section showing the lithology of the rocks.

SQUEAKS from the BULL WHEEL

Port Arms!

"Halt, who goes there?"
"Friend, with a bottle."
"Advance, Friend with the cork out!"

Oh, Sugar, Pappy

The expression (or exclamation) "Hubba Hubba" has become increasingly in vogue. Being of an inquisitive nature, Professor Zuckerfater sought to trace the etymological origin. The repetitive quality suggested a bit of the Orient. Referring to Webster's unabridged dictionary, the professor found that the *hubba* is a unit of weight used at Calcutta; being approximately equal to one-eighth of a *ratti*. A *ratti* is equal to 4 *dhans*, and a *dhan* is equal to 4 *panks*. This makes a ratti equal to 16 panks; from which it my be deduced that a single hubba means 2 panks.

"So," ejaculated the professor, "Hubba Hubba means about two panks on each fascinating rotundity."

A Woman's Way

"Darling, when did you first realize that you loved me?"

"When I began to get mad when people said you were ugly and stupid."

Half Right

"If you were half a man you'd take me to the circus."

"If I were half a man I'd be IN the circus."

Turn About

A flyer taking his solo flight saw a park down below. He decided to get a closer look. As he zoomed by, he thought he heard the statue in the middle of the park say something. The flyer went back and asked him what he said.

The statue said, "I said I wish I could be an aviator."

"Why?" asked the flyer.

The statue replied, "I just want to get a chance to fly over a pigeon, just once!"

Life Is Like This

"How helpless you men are! What would you do if there were no women to sew buttons on for you?"

"Well, m'love, if there were no women, men wouldn't need buttons."

Poet's Nook

Mary had a little wolf;
She fleeced him white as snow.
And for every dime that Mary spent,
The wolf would ask for mo'.

Good Stunt

The pharmacist's mate was preparing to fingerprint the recruit from the backwoods.

"Wash your hands," he said.

"Both of them?", asked the recruit.

The mate hesitated a moment, "No," he said grimly, "just one. I want to see how you do it".

Slight Detour

"How old are you Madam?"

"I've just reached 21, Doctor."

"Indeed! And what detained you, Madam?"

That Did It

Two rookies in the cavalry couldn't tell their horses apart, so they cut off the mane of one of the steeds. But it grew back, so they cut off one horse's tail. That grew back, too, and they were in a dilemma until one of the boys hit on a bright idea. "Let's measure them," said he. And sure enough, that worked. The black horse was two inches taller than the white horse.

Easy Way Out

A youngster trying to enlist in the Army was rejected because of bad feet. "You couldn't stand the marching," the doctor told him.

Next day the lad was back again trying to get in the Army. "Oh, it's you again?" said the medico. "Just why are you so anxious to get in the service. Patriotism?"

"No, Doc, but I walked 180 miles to join this man's Army, and I sure hate to walk all the way back home."

InNOcent Abroad

"Dear Dad," wrote the soldier overseas, "Gue$$ what I need mo$t? That'$ right. $end it along. Be$t wihe. Your $on."

The father replied: "NOthing ever happens here. Write us aNOther letter aNOn. NOw I must say goodbye."

Encore

"Why did you shoot your husband?"

"Because we couldn't afford a divorce."

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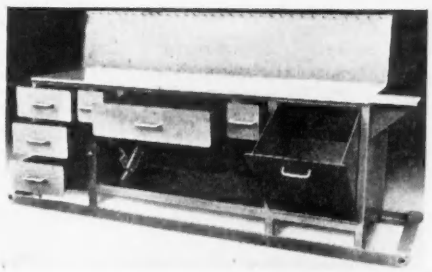

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MEN IN THE INDUSTRY NEWS

James W. Bradbury, assistant to the president of the Mene Grande Oil Company (Gulf), has retired and now is making his home in California. Bradbury was first employed by Gulf as an office boy. After working in Wichita Falls, Texas, and Houston, Bradbury was transferred to Tampico, Mexico, where he eventually became manager of Mexican Gulf Oil Company. Later he went with Mene Grande Oil Company in Venezuela and became western manager with headquarters at Maracaibo. A few years ago he was transferred to Caracas as assistant to the president.

N. V. Venus, formerly a scout for Cities Service Oil Company, has resigned and will move to Wichita, Kansas, to become an independent and lease broker. He formerly located in Jackson, Miss.

»

Norman S. McCausland has been elected to the board of directors and named treasurer of The Atlantic Refining Company. McCausland, who has been with Atlantic since 1917 and assistant treasurer for 17 years, succeeds the late **Paul Shuman.**

Frank E. Packard, general and tax attorney for Standard Oil Company of Indiana, will retire on company annuity September 1, after having served more than 25 years with the firm. He joined the company after serving the state of North Dakota as tax commissioner from 1912 to 1918 and attorney general from 1918 to 1920. Packard has for years been chairman of the central division of the American Petroleum Industries committee.

Frank E. Packard

»

Fred Lillibridge, geologist for Transwestern Oil Company at Wichita, Kansas, has joined Sunray Oil Corporation's West Texas staff at Midland.

»

Halbert E. Boner, 62, vice president and director of Macmillan Petroleum Corporation, died August 24 in Las Angeles.

»

W. B. Curtis has been appointed director of public relations for General Petroleum Corporation. He formerly was the company's advertising manager.

»

W. Tempelaar Lietz and **Walter E. Helmick,** senior exploitation engineers for Shell Oil Company, are in charge of PVT and thermo-dynamic investigations in Shell's new Los Angeles laboratory. **John I. Gates,** exploitation engineer, is in charge of chemical studies and core analysis.

»

P. C. Spencer, general counsel of Sinclair Oil Corporation, has been appointed to the American Petroleum Industries Committee of the American Petroleum Institute, succeeding the late **Grattan T. Stanford,** who was also general counsel for Sinclair.

»

C. L. Simmons, natural gas department superintendent for Magnolia Petroleum Company, has been transferred from Kermit, Texas, to Electra, and was succeeded by **V. L. Dickinson.**

»

John H. Melvin, formerly treasurer of the Pennsylvania Drilling Company, Pittsburgh, now is district geologist, U. S. Engineer Office, Omaha.

»

Russell L. White, Indianapolis banker and business man, has been elected a member of the board of directors of the Marmon-Herrington Company, Inc.

»

Stanley R. Cohagan, vice president and manager of Texas and New Mexico operations of Argo Oil Corporation, Denver, has moved district headquarters from Fort Worth to San Antonio.

AMERICANS have been handling weighty matters in heavy industrial machinery and oil country equipment for more than a quarter of a century. Leading manufacturers prefer AMERICANS because they are designed especially for smooth, dependable service in the heaviest, most powerful equipment built. Their simple construction, absolute precision and tremendous strength assure longer, safer, lower cost, trouble-free performance under the most abusive operating conditions to be found in modern industry.

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AMERICAN ROLLER BEARINGS HEAVY DUTY

AMERICAN
Heavy-Duty ROLLER BEARINGS

W. F. (Bill) Knode has been elected vice president of Rector Well Equipment Company, Fort Worth, and will serve in a research and advisory capacity. He worked as chief engineer of the Oil & Gas Division of the Texas Railroad Commission from 1931-34, organized the Alberta Conservation Board at Calgary, Alberta, Canada, and was chairman of the board for its first year, and since 1941 has had a private consulting practice in the engineering firm of Parker, Foran & Knode, with offices at Corpus Christi, Texas, and Fort Worth.

W. F. Knode

»

C. J. (Chuck) Ratigan, Mid-Continent sales manager of J. P. Ratigan Company, is leaving his Shawnee, Okla., headquarters September 1 for a three-month trip through the oil fields of Venezuela and Colombia. He expects to return about November 1.

»

Gordon B. Nicholson, has resigned from the editorial staff of THE OIL WEEKLY to become president of Airflite, Inc., a new air charter service for the oil industry with headquarters at the Houston municipal airport. After his graduation from Rice Institute, Houston, in 1934, Nicholson began his oil field experience as a roughneck. He later became the Houston representative for Technical Oil Tool Corporation, and before joining THE OIL WEEKLY in April, 1941, he was associated with Eastman Oil Well Surveying Company. In June, 1942, he joined the Army Air Corps and served 42 months.

»

R. R. (Bob) Kyner has resigned as field chairman of the East Texas Engineering Association. He will open a consulting engineering office in the Cotton Exchange Building, Houston.

»

Harry D. Easton, Jr., Shreveport petroleum engineer who recently was released from the Army with the rank of colonel after five years of service, has been elected vice president of the Great National Oil Corporation of Louisiana.

»

J. C. Riley, Jr., former division sales manager in Tulsa for the D. & B. Pump division of Emsco, Inc., recently joined **George R. Brown, Jr.,** in forming the Western Pipe & Equipment Company, to be located in the Neil P. Anderson Building, Fort Worth.

»

Aubrey T. Gholson, sales manager for Hovey Petroleum Company, Houston, was elected vice president of the oil export and import firm. Gholson joined Hovey after he was discharged from the Army in September, 1945.

Robert J. Derby has been transferred from Houston to the New York legal department of The Texas Company. He has been in the department since 1945. Before that time he was special assistant at the United States Embassy in Bogota, in charge of the economic warfare program.

»

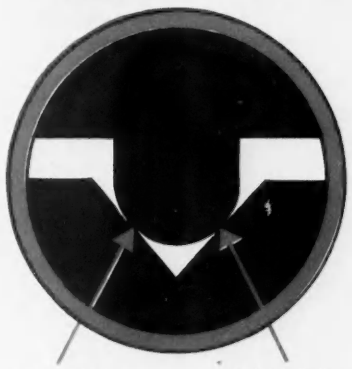
Dwight R. Collin has been named personnel director of Mack Manufacturing Corporation.

Glenn G. Bartle, formerly with E. Holley Poe and Associates of New York City, has become dean of the Triple Cities College of Syracuse University at Endicott, New York, and professor of geology in that institution.

»

H. H. Juday has returned to the Purchasing Agents Association of Oklahoma City from Dallas, and will become assistant editor of the *Purchasing Digest*. Juday formerly was president of the association.

Three and Two Make . . .



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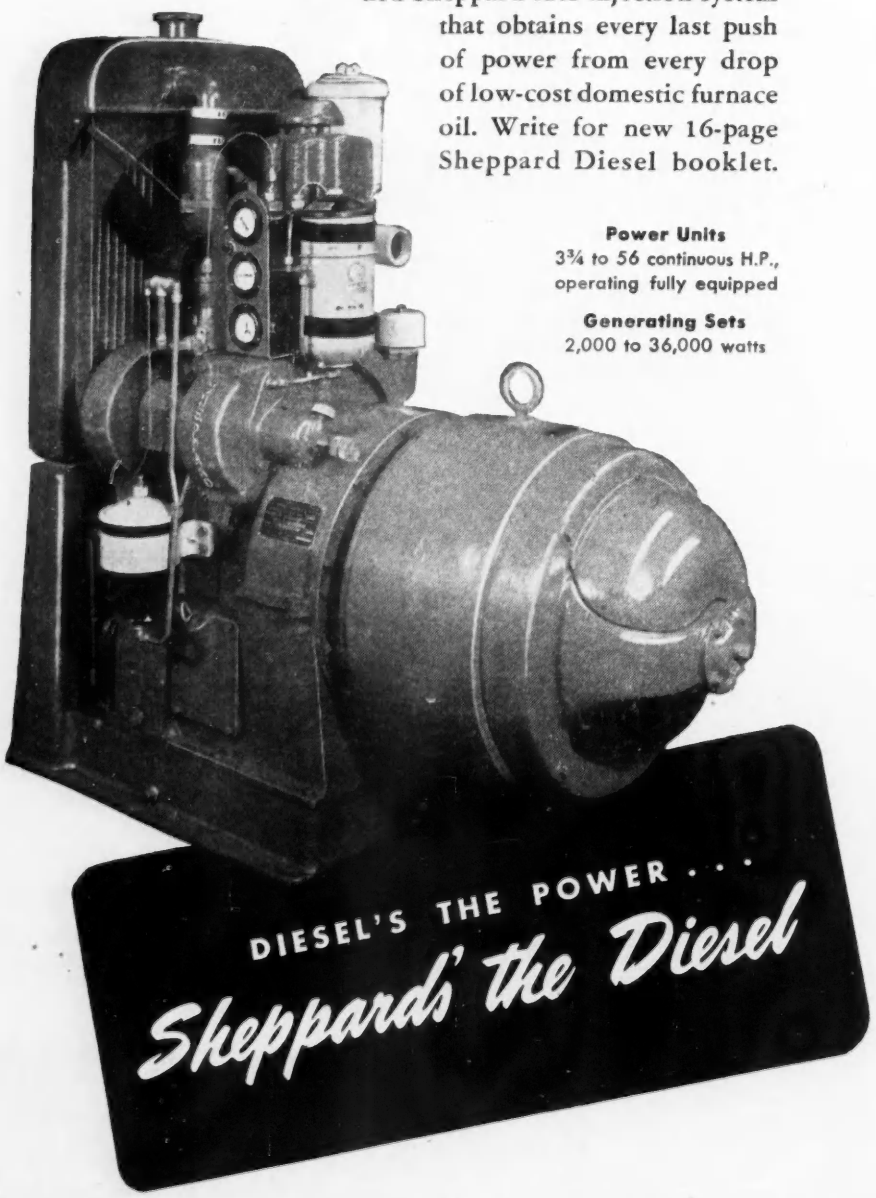


R. H. SHEPPARD COMPANY, INC., 21 Middle St., Hanover, Pa.

L. D. McNeill has been named store manager of The Continental Supply Company's Houston branch. He succeeds **R. L. Pebworth,** resigned.

»

E. R. Gilmore has been appointed chief engineer of the Pittsburgh Equitable Meter Division of Rockwell Manufacturing Company, Pittsburgh, and will be in charge of engineering and development of meters and regulators for the control of gas, gasoline and oil. He has been engaged in the field of measurement and control since 1920, and has been with the company since 1936.

»

F. E. (Gene) Miller has been employed by Interstate Oil Pipe Line Company as editor of the company's employe publication, *The Liner,* and will assist with public relations work. He resigned as assistant publicity manager of the Tulsa Chamber of Commerce to join Interstate, effective September 11. He succeeds **Willard L. Bassmann,** who will be transferred to the Employe Relations department.

»

Roy Ralston, former district landman at Evansville, Ind., for Skelly Oil Company, has resigned to join the land department of Ashland Oil & Refining Company, Henderson, Ky.

Deaths

Paul Shuman, 62, treasurer of The Atlantic Refining Company, died August 22 in Malvern, Pa. Shuman became associated with Atlantic in 1920, his first position being an accountant in the controller's office. Nine years later he was elected assistant treasurer, which post he held until 1937, when the board chose him as treasurer. He had been a member of the board of directors since October, 1939.

Paul Shuman

»

Robert Leonard Ferguson, 48, Dallas, chief pump maintenance man for Magnolia Petroleum Company for 20 years, died August 29.

»

Clarence R. Weber, 52, Tulsa resident for 20 years and chief accountant in the drilling department of Barnsdall Oil Company, died in Tulsa August 27 after an illness of several months. He moved to Tulsa from Pennsylvania in 1926. He was employed by The Pure Oil Company for several years and joined Barnsdall in 1942.

»

J. M. McMorrow, Wichita Kansas, independent oil man, died in Wichita August 27. He was a native of West Virginia.

»

James William Holman, 70, Tulsa, retired independent oil operator, died in Tulsa August 21. He had lived in Oklahoma 35 years.

World's Deepest Cutting Job Uses Shaffer Equipment

In what is believed to be the deepest successful cutting job on record, Shell Oil Company recently recovered all but a fraction of 3½-inch drill pipe that had been cut at 14,601 feet. The fishing job occurred at Signal Hill, Calif., when 12,480 feet of drill pipe were dropped in a 14,870-foot hole.

An attempt to pull the fish proved unsuccessful. It was then decided to attempt to recover the fish by taking hold of it with a fishing string and cutting the pipe. A 2¼-inch outside diameter Shaffer internal pipe cutter was run in on a string of 1.66-inch outside diameter upset tubing and set at 14,775 feet. A kinked condition made rotation impossible, so cutter was raised to 14,730 feet. This was probably the deepest cut ever made. An attempt was made to pull the fish, using a Shaffer-Hamon releasing socket that was on the fishing string. A pull of 280,000 pounds was taken on the fish. When the pumps were applying pressure at 4000 pounds, the packer in the socket blew out. In spite of the tremendous pull that had been taken on the tool, it readily released from the fish without the use of a bumper sub. The usual bumper sub had been left off in this case because of insufficient inside diameter.

A second cut was made at 14,601 feet. This time the socket packer successfully withstood a pump pressure of 5000 pounds. Although no circulation was obtained, continued working of the fish finally loosened it and it was successfully pulled from the hole with the Shaffer-Hamon socket. Several attempts were made to recover the remainder of the drill pipe but it was so badly stuck that Shell finally whipstocked past at 14,601 feet.

Continuous Seamless Pipe Mill Developed by National Tube

Developed by National Tube Company engineers, a continuous seamless pipe mill is scheduled for installation at the Lorain, Ohio, plant of this U. S. Steel subsidiary. The continuous rolling process will be employed for the first time at Lorain to turn out long lengths of steel pipe without welds at a rate of 2000 feet per minute. The new process is said to eliminate several steps in conventional methods of making seamless pipe. The new Lorain mill is designed to make small-size seamless products ranging from two-inch boiler tubes to 4½-inch standard pipe.

Promotion of Four Executives Announced by Oil Well Supply

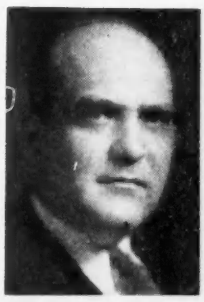
Oil Well Supply Company has announced the promotion of F. D. Smith as assistant to the general manager of sales; John E. Miller as machinery service manager, general sales department; C. M. Wittum as eastern division credit manager; and L. L. Mitchell as assistant treasurer and assistant general credit manager with headquarters in the executive offices in Dallas.

Smith has been connected with the company, a U. S. Steel Corporation subsidiary, for 18 years. He has served as manager in the Kentucky and Michigan districts, and later became eastern division manager at Mt. Vernon, Ill. He went to Dallas as supervisor of the general sales department in 1944. Miller has been connected with the company since 1933, and served several years as field engineer and sales engineer. Mitchell joined Oil Well Supply in 1940 and has served in California, Pennsylvania and Ohio.

William J. Morris Retires from Post With Continental Supply

William J. Morris, chairman of the board and chief executive officer of The Continental Supply Company, retired from active management September 1. Frederick M. Mayer, president, has become chief executive officer with Morris continuing as chairman of the board in an advisory capacity.

William J. Morris



Frederick M. Mayer

Morris' retirement comes after 40 years of uninterrupted service with Youngstown Sheet and Tube Company and its subsidiaries. He was named president of Continental in 1932 and became chairman of the board in July, 1945. He was with the Youngstown firm from 1906 to 1932. He started his career with Youngstown as a timekeeper, later becoming, successively, assistant treasurer, treasurer, and vice president. Mayer became treasurer of Continental in 1932 and was elected a vice president in 1933. He was named president of the company in July, 1945.

"Twenty-Five Years" Is Title of Book on Cameron Iron Works

"Twenty-five Years" is the title of a most interesting book privately printed by the Cameron Iron Works and dealing with the first 25 years of its life. Cameron Iron Works celebrated its 25th birthday on August 20.

While the book deals with the history of the company from 1920 to date and includes a most interesting biography of men associated with the company, it reveals a participation in the war effort which most people in the oil industry have not known about. The industry generally was familiar with the fact that Cameron Iron Works had been the recipient of six Navy "E" awards, in itself an outstanding accomplishment, but the wide variety and the large quantity of naval equipment made in the company's plants in Houston are not generally known to the oil industry. The book is an outstanding bit of planning and execution.

Seismograph Service Firm's Stock Offering Is Subscribed

An offering of 140,000 shares of common stock of the Seismograph Service Corporation, Tulsa, at $12 per share, less $1.50 underwriting discounts or commissions, has been subscribed, Gerald H. Westby, president, announced. A total of 70,000 shares of the offering were sold by the company, and 70,000 by certain stockholders.

Net proceeds of the sale received by the company are estimated at $719,266, after deduction of estimated expenses to be borne by the company.

Present plans for use of the proceeds, Westby said, include the expenditure of approximately $110,000 to purchase or construct four heavy seismograph shot hole rotary drills and two light shot hole rotary drills and the necessary water tenders, so that the company can perform more of the drilling operations required in its business.

FWD Distributor Named

The Flesch-Miller Tractor Company has been appointed distributor in southern Indiana for The Four Wheel Drive Auto Company. H. G. Engel is sales zone manager in the midwestern states for the latter company.

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BE SURE TO CHECK THE
TRADING POST SECTION
ON PAGE 56 OF THIS ISSUE

Carter Company and Employes Receive Awards from Navy

Awards for research work on secret wartime devices have been received from the Navy by The Carter Oil Company and 60 of its employes. Awards consisted of a special Naval Ordnance Development Award Certificate to the company and certificates and emblems to employes who received them at a special ceremony at Carter's laboratory at Tulsa.

Official notification by the Navy Department stated that the Carter research workers were instrumental in helping to develop the VT or proximity fuse which played a big part in defeating the Japanese kamikaze attacks.

Individuals receiving Naval Ordance Development Award Certificates were Dr. A. B. Bryan, Dr. P. S. Williams, R. W. Gemmer, F. G. Boucher, Ben W. Sewell, Dr. E. M. McNatt, Dr. Norman Ricker, R. S. Dahlberg, Jr., V. A. Acheson, C. C. Nash, Jr., R. H. Blood, P. H. Foster and Harold F. Moses.

Naval Ordnance Development Award lapel emblems were presented to J. T. Ogden, C. H. Vickers, L. E. Finley, H. J. Roch, R. L. Huckabee, W. I. Bolt, C. E. Schiller, E. M. Lang, Theodore Voorhees, H. V. Carmichael, Lucille Cargile, C. J. Gamble, O. A. Farnum, H. C. Brunner, B. F. McCoy, C. A. McKinney, G. S. Rorschach, C. T. Diffendaffer, Jr., J. H. Douglas, T. C. Finn, F. L. Long, O. W. Partain, H. N. Pool, P. W. Whitaker, E. D. Merritt, Bernice Gault, Valdevia Eldridge, Lillie Patterson, A. T. Clothier, L. M. Denton, Dr. M. W. Kriegel, E. L. Booth, M. E. Morrow, H. H. Baker, C. L. Sharp, H. W. Wilson, C. E. Magee, J. E. Bennett, P. M. Potts, Mary Calvert, Cleo Tracy, J. V. Price, Magdeline Trout, Larue Williams, Frances Courington, Mildred Novak and J. J. Heigl.

THE OIL MAN'S CALENDAR

SEPT.	
9–13	American Chemical Society, Including Petroleum Division, Annual Meeting, Chicago.
10–12	Pacific Coast Gas Association, Annual Convention, San Francisco, Fairmont Hotel.
18–20	National Petroleum Association annual meeting, Atlantic City, Hotel Traymore.
18–20	Oklahoma Liquefied Petroleum Gas Association Annual Convention, Oklahoma, City, Skirvin Hotel.
20	Gas Division, Oklahoma Utilities Association, Annual Fall Meeting, Biltmore Hotel, Oklahoma City.
25	API Directors Meeting, New York, Carlton Hotel.
26	National Petroleum Council, Washington.
OCT.	
1– 2	American Association of Oilwell Drilling Contractors, Annual Meeting, San Antonio, Plaza Hotel.
3– 5	AIME, Petroleum Division, Annual Meeting, Galveston, Hotel Galvez.
7– 9	American Society of Mechanical Engineers, National Conference, Mayo Hotel, Tulsa.
11	California Natural Gasoline Association Annual Fall Meeting, Los Angeles.
7–12	American Gas Association, Annual Convention, Atlantic City, N. J.
16–18	Texas Mid-Continent Oil and Gas Association, Houston, Rice Hotel.
24–25	AIME, Petroleum Division, Annual Meeting, Los Angeles, Ambassador Hotel.
24–25	American Association of Petroleum Geologists, Mid-Year Meeting, Biloxi, Mississippi, Buena Vista Hotel.
28–30	Independent Petroleum Association of America, Annual Meeting Fort Worth.
NOV.	
11–14	American Petroleum Institute, Annual Meeting, Chicago, Stevens Hotel.
21–23	Rocky Mountain Oil and Gas Association, Annual Meeting, Denver, Shirley-Savoy Hotel.
DEC.	
4	New Mexico Oil & Gas Assocation, Annual Meeting, Artesia.

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